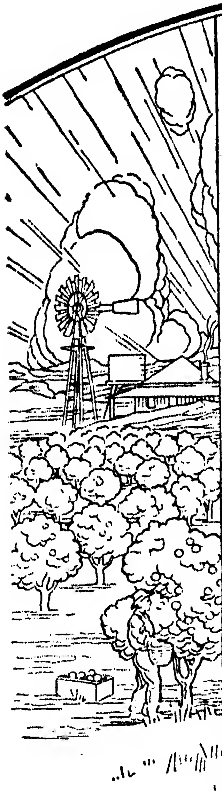
Volume LV

QUEENSLAND AGRICULTURAL JOURNAL



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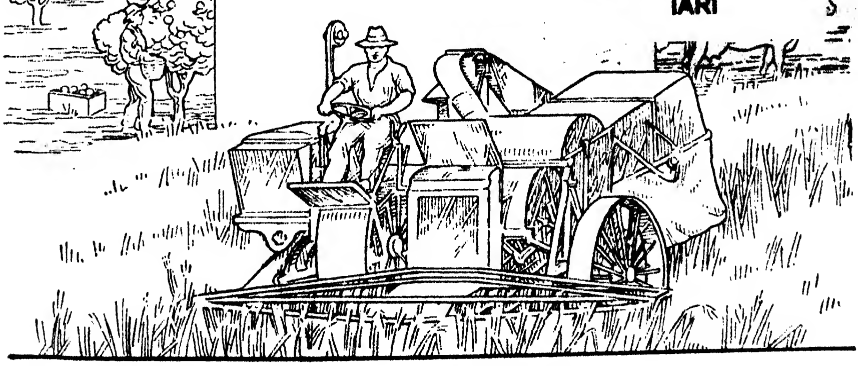

JANUARY to JUNE, 1941

Vol. LV. Parts 1 to 6

QUEENSLAND AGRICULTURAL JOURNAL

GENERAL INDEX

M

N

T

INDEX TO ILLUSTRATIONS

AUTHOR INDEX

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QUEENSLAND AGRICULTURAL JOURNAL

Vol. LV. 1 JANUARY, 1941. Part 1

Event and Comment

The King Speaks to His People.

"REMEMBER this: If war brings separations, it brings new unity also—unity coming from common perils and common sufferings willingly shared," said the King in a Christmas address broadcast to the Empire.

"We have surmounted a grave crisis," His Majesty added. "We don't underrate the dangers and difficulties still confronting us, but we take courage from the successes which our fighting men and their allies have won against heavy odds on land, at sea, and in the air. . . .

"War brings among other sorrows the sadness of separation. There are many men in the forces away from their homes to-day, because they must stand ready and alert to resist the invader should he dare come or because they are guarding the dark seas or pursuing the beaten foe in the Libyan desert.

"Many circles are broken. Children from English homes to-day are in Australia, Canada, New Zealand, and South Africa.

"Not only has the manhood of the whole British Commonwealth again rallied to aid the Mother Country in her hour of need, but the peoples of the Empire have eagerly opened the doors of their homes to our children in order to spare them the strain and danger of modern war.

"In the United States, also, where we find so many generous, loyal friends and organisations to give us unstinted help, warm-hearted people are caring for many of our children till the war is over.

"But how many more children are there here who have been moved from their homes to safer quarters?

"To all of them at home or abroad, who are separated from their fathers and mothers, to their kind friends and hosts, to all who love them, to parents, who are lonely without them, all in our dear island, I wish every happiness Christmas can bring.

"May the New Year carry us towards victory and happier Christmas days when everyone will be at home together in the years to come.

"To the older people here and throughout the world I say that in the last war the flower of our youth was destroyed while the rest of the people saw little of the battle. This time we are all in the front line and in danger together. I know the older ones are proud it should be so.

"To be good comrades, and good neighbours in trouble is one of the finest opportunities of the civilian population and by facing the hardships and discomforts cheerfully and resolutely they not only do their duty but play a part in helping the fighting services win the war.

"Time and again during the last few months I have seen for myself battered towns and cities in England; I have seen the British people facing their ordeal.

"I can say to them all that they may be justly proud of their race and nation. I have seen every side of the new splendid spirit, and good fellowship springing up in adversity, and also a real desire to share the burdens and resources alike.

"From all this suffering there is growing a harmony which we must carry forward into the days to come when we have endured to the end and victory is ours.

"Then, when Christmas days are happy again, and goodwill has come back into the world, we must hold fast to the spirit binding us all together now.

"We shall need this spirit in each of our own lives as men and women. We shall need it even more among the nations of the world.

"We must go on thinking less about ourselves and more for one another, for so—and so only—can we hope to make the world a better place and life a worthier thing.

"Now, I wish you all a happy Christmas and a happier New Year. We may look forward to the new year with sober confidence.

"The future will be hard, but our feet are planted on the path to victory and with the help of God we shall make our way to justice and peace."

The Front Line of Freedom.

WE are all naturally interested in how the farmers of Great Britain are faring these days, especially as developments in the Old Country have in one way or another a direct bearing on our own future as a component of the British Commonwealth. One important thing which has developed out of the present situation is a general appreciation of the right of primary producers to a fair deal in the matter of prices. On that basis a solid foundation is being laid for long-term prosperity in agriculture. The farmers of Britain are determined that they will not again allow themselves to be led up the garden path, as happened after the last war. The first thing, however, is to ensure victory, and in this regard the food producers are doing a noble, wholehearted, and very effective best. Food production at this time of crisis is obviously one of the vital factors in the achievement of victory. The people of the Empire know that they can rely on the farmers in any emergency. It is good to know, too, that a plan has been evolved, or rather a price structure has been devised to "reconcile just treatment for the producer with the requirements of the nation"—not, of course, that the farmers need any such stimulus to their stern resolve to pull their weight in winning the war and to-day, to quote Winston Churchill, "the farms of Britain are the front line of freedom."

New Uses for Farm Products.

FARMERS in Australia, as elsewhere, are faced with all sorts of difficulties, especially in relation to the profitable disposal of crop surpluses. Many changes in rural economy are not unlikely in the near future and, probably, before very long farmers will be producing for something more besides the people's pantry. In addition to food crops, they will be producing, as some already are, raw material for a multiplicity of industrial uses. For instance, one American firm has spent over £3 millions in buying agricultural products for use in the chemical industry, while four years ago the whole crop of soya beans from 50,000 acres was used by one United States organisation alone for the manufacture of motor car accessories.

We have a big job ahead of us and we shall have to get busy on collating all the information we can on our rural resources, and the extent to which it may be practicable to produce for future industrial needs. With the sorting out of all the information obtained and obtainable, it will be possible to plan for the ever-widening demands of modern industry. There is, therefore, a definite obligation on us to survey and tally our present resources, not only in respect of war-time essentials but also in anticipation of the requirements of the reconstructional period when the world regains its reason. Everyone knows that tremendous social, technical, and economic problems have yet to be solved, but we ought to be far-sighted enough to see the possibilities beyond our present difficulties, and game enough to grasp the opportunities when they come knocking at our door.

Some Queensland Couch Grasses.

L. S. SMITH, B.Sc., Assistant to Research Officer.

A FEW months ago it was found that losses of sheep at St. George were caused by the Common Native Couch. A number of couch grasses occur in Queensland, and some confusion exists concerning their identity. The name "Couch" is usually applied to any creeping grass which does not already possess some other distinguishing name, so that botanically they may not be at all closely related. As some contain a prussic-acid-yielding glucoside and others do not, identification of the species is important. The following account has been designed to assist in distinguishing the common species occurring in this State and to indicate those which are poisonous.

Key to the Species Dealt With.

In attempting to identify a particular couch grass, the following key should be used as a preliminary. Whether or not the name tentatively worked out from the key is correctly applied to the specimen may be checked by a comparison with the fuller description given further on.

Should at any time the specimen agree with neither group of characters in any pair in the key, then it is not dealt with. The size of the seed can readily be determined by making it stand at right angles to the ray of the seed-head by inserting the finger nail over the tip of the seed and pulling it downwards.

I. Seeds on slender stalks of varying length; these stalks up to about one-tenth of an inch long. At the junction of the blade and sheath of the leaf is the ligule composed of a white, tissue-paper-like flap up to nearly one-twelfth of an inch long (Plate 2, fig. 5c). The grass has characteristic bluish-green leaves, forms a continuous ground cover, and is commonly used for lawns on the subtropical seaboard.

*Blue Couch.**

Seeds all unstalked. The ligule is always very small and less than one-thirty-second of an inch in length (Plate 2, fig. 1c).

II.

II. Grass forming a continuous ground cover. It occurs in both coastal and western Queensland, is of perennial duration, and in the west typically grows along bore drains or near water.

Common Couch.†

Grasses sending out short runners, but these not intermeshing and forming a continuous ground cover between the tufts. They are solely inland grasses, are of annual duration, and grow in open grassland or open forest country, and not typically along bore drains nor near water.

III.

III. Leaf sheaths and blades bearing numerous slender spreading hairs. Seed-head composed of two spikes or only one. Seeds exceeding one-eighth of an inch in length. This is only found in the far central and south-western areas.

Hairy Native Couch.‡

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* *Digitaria didactyla* Willd.

† *Cynodon dactylon* (L.) Pers.

‡ *Brachyachne ciliaris* (Benth.) C.E.H.

Hairless grasses, except, perhaps, for a few at the base of the leaf blades. Seed-head generally consisting of three or more spikes These two grasses do not extend further west than the railheads, except in the far north-west.

IV.

IV. Seeds larger, one-eighth to one-sixth of an inch long.

*Common Native Couch.**

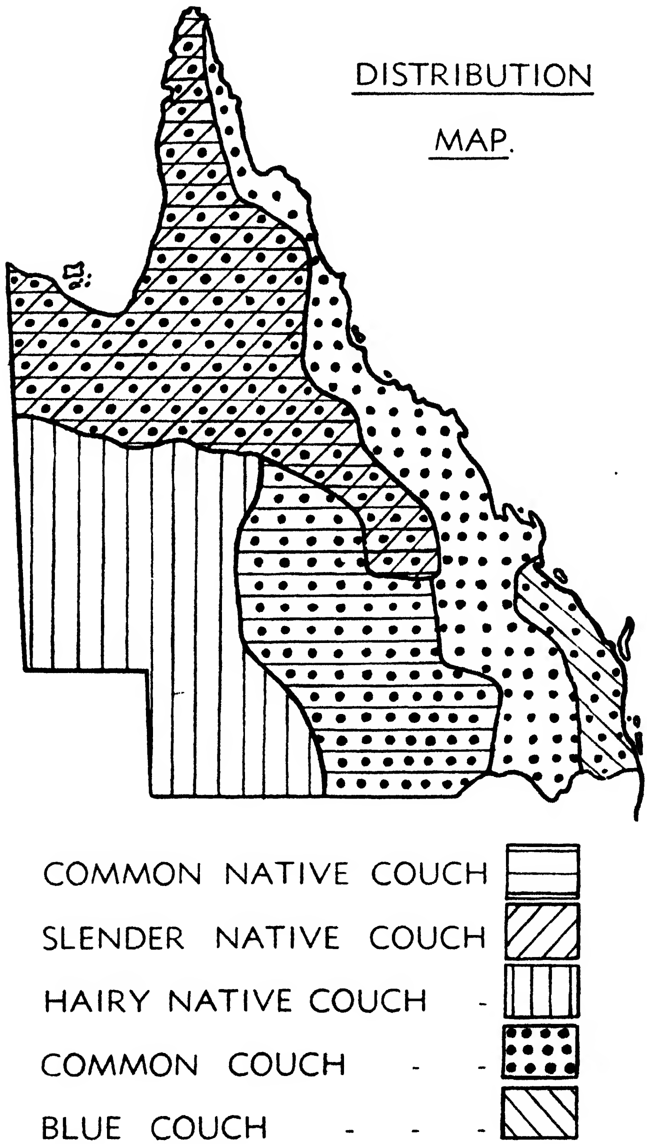

Plate 1.

MAP SHOWING THE DISTRIBUTION OF FIVE SPECIES OF COUCH GRASS.

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* *Brachyachne convergens* (F. Muell.) Stapf.

Seeds smaller, less than one-tenth of an inch long. Generally a more slender and less common grass than the preceding.

*Slender Native Couch.**

The above key will broadly differentiate the various species, but, as an additional help, a map (Plate 1) showing the approximate distribution of the species has been prepared from available collections. The map must, however, be taken as tentative, and a rough approximation only, for the distribution of the different grasses is not well defined and they overlap to some extent.

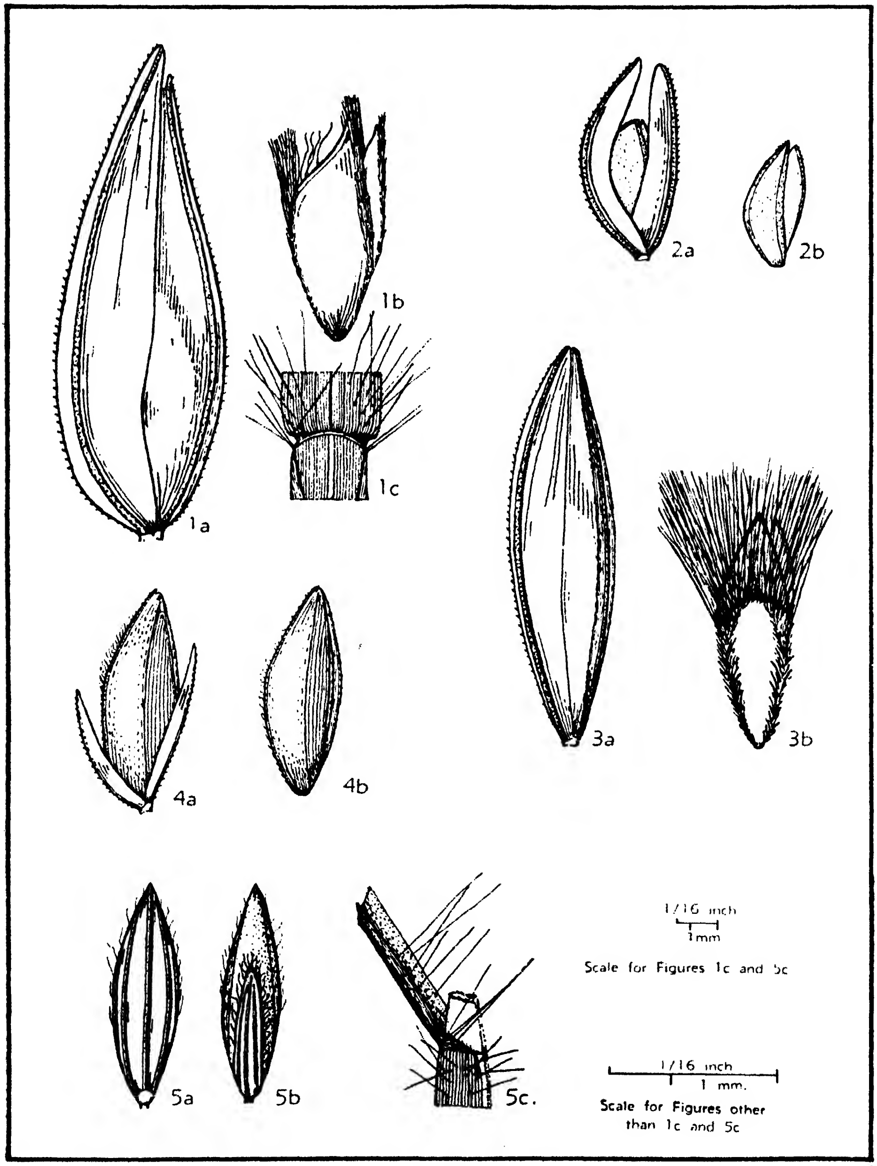

Plate 2.

* *Brachyachne tenella* (R. Br.) C.E.H.

Blue Couch.

Description.—A rather long creeping slender grass, which, spreading by means of numerous runners, forms a continuous ground cover. The flowering stems reach 1 foot in height, though on grazed land they are often less. The blades of the leaves are a characteristic bluish-green colour, from 1 to 5 inches long, one-sixteenth to one-eighth of an inch wide, and taper into a fine point. The sheath of the leaf surrounding the stem is spreadingly hairy as is also the lower part of the blade. At the junction of the blade and sheath is a small white tissue-paper-like flap, the ligule, up to nearly one-twelfth of an inch long. The seed-head is composed typically of two or three oblique slender rays bearing numerous seeds. The rays of the seed-head are from 1 to 3 inches long. The seeds measure one-twelfth to one-tenth of an inch in length, are a pale greenish colour, and show a few longitudinal ridges on the outer face. They are borne on slender stalks of from one-thirty-second to one-tenth of an inch long.

Distribution.—It is an introduced species and was first noticed in the vicinity of Nudgee about 1906, but has since spread over the sub-tropical seaboard. It also occurs in Madagascar, Mauritius, and Indo-China.

Properties.—Blue couch is one of the commonest lawn grasses in the southern coastal districts of Queensland, where it does quite well. As a fodder species it is of doubtful value. Although it provides some feed in the summer months on the river flats, it sometimes encroaches upon the hillside pastures where it is usually too low growing to provide much feed and yet tends to smother more useful species. It dries off rapidly during the winter months, showing up as brown patches, though it soon responds to rain. No prussic-acid-yielding glucoside has so far been found in the grass.

Common Couch.

Description.—A rather slender creeping grass which frequently forms a dense sward by means of its many surface and underground runners. The flowering stems are up to 1 foot in height. Throughout Queensland the many forms of this species vary both in general appearance and in the size of the various parts. The blade of the leaf is usually green, but in the west it is sometimes a pale greenish colour. It is up to 4 inches long and one-tenth of an inch wide, though in many instances the leaf is shorter. Typically, both blade and sheath are hairless, but at the junction there is a tuft of whitish hairs. The seed-head consists of from three to six rays, each from ½ to 2½ inches long and frequently purplish tinged. The unstalked seeds are densely arranged and appressed to the rays. Each seed measures one-twelfth of an inch or slightly less in length.

Distribution.—This grass was first described from specimens collected in southern Europe, and is widely spread over the tropical

DESCRIPTION OF PLATE 2.

COMMON NATIVE COUCH.—1a.—whole seed or spikelet; 1b.—floret; 1c.—junction of leaf blade and sheath showing ligule.

SLENDER NATIVE COUCH.—2a.—whole seed or spikelet; 2b.—floret.

HAIRY NATIVE COUCH.—3a.—whole seed or spikelet; 3b.—floret.

COMMON COUCH.—4a.—whole seed or spikelet; 4b.—floret.

BLUE COUCH.—5a.—whole seed or spikelet; 5b.—back of seed; 5c.—junction of leaf blade and sheath showing ligule.

and subtropical regions of the world. It occurs both in the coastal and inland parts of Queensland, and although it occupies a variety of situations on the seaboard, it is usually commonest on the margins of bore drains, tanks, rivers, and similar places in western Queensland.

Properties.—Common couch is a useful binder for bore drains and creek banks, and in America, where it is known as Bermuda Grass, it is used extensively to prevent erosion. It is also quite a good fodder. So far, although chemically examined on a number of occasions, the common form of the common couch has not been found cyanogenetic. Besides the common form, however, there are two other forms of this grass which are worthy of mention since both are cyanogenetic. One is a large form and the other is a hairy form.

The large form* is, as its name indicates, a larger type of grass than the common form and is taller and more luxuriant with broader leaves. It differs from the common form in having the leaf blades up to 6½ inches long and one-quarter of an inch wide, and in having four to seven rays in the seed-head; moreover, the larger seeds are more than one-twelfth of an inch long. Like the common form it is hairless except at the junction of the leaf and sheath. So far as is at present known this large form only occurs at Nerang and Brisbane in the Moreton district. It is probably an introduced form and may have come from South Africa. Small amounts of a prussic-acid-yielding glucoside have been found in it.

The hairy form† closely resembles the common form in general appearance, but differs from it in having either the leaf blade alone or the leaf blade and the sheath, sparsely covered with short hairs about one-sixteenth of an inch in length. The leaves have a slightly bluish-green colour and are generally more rigid than in the common form. The rays of the seed-head are commonly one to four in number, while the seeds are larger than in the other two forms and exceed one-tenth of an inch in length. So far, this form has only been found in the Dalby, St. George, and Dirranbandi districts. Specimens from near Dirranbandi, and St. George, areas where there had been previous deaths of sheep, were found to be cyanogenetic.

Hairy Native Couch.

Description.—A low, tufted annual grass from 3 to 9 inches high, with the stems much branched at the lower notches, the outer ones spreading and sometimes lying along the ground at the base and rooting from a few of the lower notches. The stems and seed-head are purple coloured at times. The leaf blades are short, ½ to 1½ inches long and up to one-tenth of an inch wide. Both the leaf blade and the sheath are densely hairy with fine hairs over one-tenth of an inch in length. These hairs may quite easily be seen with the naked eye by viewing the grass against a suitable background. At the junction of the leaf and sheath on the inner side the ligule consists of a very short white rim. The seed-head is typically composed of two rays, less commonly of only one, and rarely of three rays. Each ray is from 1 to 2½ inches long.

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* According to Mr. C. E. Hubbard, a grass specialist at the Royal Botanic Gardens, Kew, this form agrees more closely than the common Queensland form with specimens from southern Europe, from which locality the species was originally described.

† This agrees fairly well with *Cynodon dactylon* (L.) Pers. var. *pulchellus* F. Muell.

The unstalked seeds, which overlap, are densely arranged along and are appressed to the rays. They measure from one-eighth to almost one-sixth of an inch in length.

Distribution.—The grass is native to the central portions of Australia, occurring in Central Australia, northern South Australia, north-western New South Wales, and the far south-western and central-western areas of Queensland. Roughly, its eastern boundary in Queensland lies along a line drawn through the main western railheads.

Properties.—Practically nothing is known about its reputation as a fodder, and it has not yet been subjected to chemical analysis. Since both of the other Queensland species of native couch are poisonous, it would not be surprising to find that hairy native couch also contains a prussic-acid-yielding glucoside.

Common Native Couch.

Description.—A tufted annual grass up to 1 foot high, with the outer stems spreading at the base and much branched at the lower notches. It usually throws out a few relatively short runners, but these are not numerous enough to form a continuous ground cover. The leaf blades are commonly 1½ to 3 inches long and one-tenth to one-fifth of an inch wide, of a greenish or pale-greenish colour, and more or less loosely hairy in the lower part. The leaf sheath is hairless. At the junction of the leaf and sheath there are a few fine hairs on each side and a very small white rim. The seed-head is composed of three or four relatively stout, pale or slightly purplish rays at the top of the stem; less commonly there are two, five, or six rays, and these vary in length from 1 to 3 inches. The unstalked seeds are tightly appressed to the rays and overlap one another, and measure between one-eighth and one-sixth of an inch in length.

Distribution.—This is a native of Northern Australia and is found in a broad band running through North-Western Australia, the Northern Territory, and Queensland into New South Wales. In Queensland the common native couch, or Gulf Star Grass as it is sometimes called, occurs in the north from Mareeba across through the Gulf country to Camooweal. To the south, the western boundary seems to run roughly from Camooweal through Cloncurry to near Longreach, thence south to Cunnamulla and the New South Wales border. The Main Divide limits the distribution to the east except that the grass occurs in the Charters Towers and Clermont-Springsure areas, but not on the Darling Downs.

Properties.—Conflicting reports have been received from various places regarding its fodder value. Around the Gulf it is looked upon as a useful fattening grass, while in more southern areas it is usually left alone while other grasses are available, although when drying off at maturity it is sometimes eaten.

Chemical analysis of material from St. George indicated that about three times what is generally regarded as a dangerous amount of prussic acid was contained in the sample. As some of the glucoside had no doubt decomposed during transit, the analysis figure may be taken as conservative. Until more is known concerning the dangerous periods of growth, &c., the grass should be treated as a dangerous one.

Slender Native Couch.

Description.—A slender tufted annual grass with the stems erect, oblique, or shortly creeping and branched at the lower notches. The flowering stems are up to 1 foot high and pale yellowish coloured. Both the leaf blade and sheath are hairless. The blades are green or pale-green in colour, those on the shoots ¾ to 1 inch long and one-sixteenth of an inch wide, those on the flowering stems up to 3½ inches long and one-tenth of an inch wide. At the junction of the leaf and sheath the ligule consists of a very narrow whitish rim, with usually no hairs near it. The pale-greenish rays of the seed-head are slender, 1 to 3 inches long, and commonly two, three, or four in number, though actually the number may range from one to six rays. The numerous small unstalked seeds overlap and vary from one-twelfth to one-tenth of an inch in length.

Distribution.—The grass is a native of the Northern Territory and Queensland. So far, it has been recorded in Queensland from the area between Springsure and Blair Athol, from Prairie near Hughenden, and also from Mareeba. It is probable that the area occupied is much larger than that indicated, however, and that it extends across through the Gulf country to the Northern Territory border as in the case of the common native couch. The latter is apparently much more common than the slender native couch which has probably been overlooked and confused with it.

Properties.—Little is known concerning the fodder value of this grass. Specimens from the Clermont district have been chemically examined and found to contain sufficient prussic-acid-yielding glucoside to be regarded as potentially dangerous.

Other Couch Grasses.

Throughout Queensland there are some other grasses known as various kinds of couch. Three well known species are Giant Couch*, Water Couch†, and Salt Water Couch‡. Giant Couch, or Para Grass, as it is more frequently called, is a valuable fodder grass which is widely spread over the eastern seaboard of Queensland. It is frequently planted as a pasture grass in higher rainfall areas or on swampy land and is useful for reclaiming the latter. The grass is a native of Brazil. Water couch and salt water couch are closely allied grasses and resemble one another in appearance. The former grows near fresh water, while the latter occurs on saline flats and swamps. In their respective habitats they are each useful fattening grasses. None of these three grasses has been suspected of being poisonous in Queensland, and, as mentioned, are useful species.

* *Brachiaria purpurascens* (Raddi) Henr. (*B. mutica* Auct.).

† *Paspalum distichum* Linn.

‡ *Paspalum vaginatum* Sw.

NOTICE TO READERS.

Because of the present necessity for strict economy in the use of paper, readers are requested to renew their subscriptions promptly. If renewals are unduly delayed, it may be impossible to supply back numbers of the Journal.

Address all renewals and other correspondence to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Poison Plants.

JOHN LEGG, D.V.Sc., Animal Health Station, Yeerongpilly.

THE heavy annual loss of stock from poison plants in Queensland makes the study of the subject of plants poisonous to animals a very important one, and for this reason a more intensive investigation has been made of the problem over the last few years. During the course of this enquiry many experiments have been performed to test the alleged lethal qualities of certain plants, much information has been gathered from the field regarding the special circumstances under which poisoning of stock occurs, and the most useful and valuable points which emerge from the pursuit of these enquiries is being placed on record, where they will be available for future use.

A poisonous plant has been defined by Steyn as one which, when consumed by an animal over short or prolonged periods, exerts harmful effects on the system or causes death by reason of the presence of toxic substances in that particular plant.

It is, however, very difficult to define fully the term poisonous plant. Many produce harmful effects because of their fibrous nature which affects the animal in a mechanical way; others are harmful because of the presence of armed fruiting bodies. Again, others are quite good fodders in the ordinary way, but under certain conditions of soil, climate, and possibly other factors they become poisonous; a few because of the presence of certain plant parasites—e.g., ergot.

Factors which Influence Toxicity.

Plants of the same species can vary widely in their toxicity. This may be due to locality, soil, climate, or some other circumstance, but this does not fully explain all these variations. It is known that plants of the same species growing side by side vary in their specific toxic content, and it has been suggested that certain strains of a species may be more toxic than other strains.

(*a*) *Soil.*—The composition of the soil and soil content of particular elements influences the make-up of the plant and may convert an otherwise harmless plant into a poisonous one. One of the best known examples of this is the selenium poisoning in certain areas of the United States of America. For many years a peculiar disease of stock prevented the development of certain areas of western United States of America. The cause was unknown until it was determined that the soil content carried a high percentage of selenium salts, and these in turn were taken up by the plant and passed on to the animal, causing unusual symptoms which we now know to be due to the presence of these selenium compounds.

The presence of nitrates in the soil no doubt influences the amount the plant will take up, particularly at certain times of the year and during certain stages of growth. It has recently been shown that the poisonous effects of the ordinary mint weed (*Salvia reflexa*) is due to the large quantity of nitrate present, and this can produce very serious effects upon the host.

Atalaya or whitewood is another common Queensland plant which appears to vary in toxicity and according to locality and soil. In the

Gulf country and North Australia generally it is regarded, and probably rightly so, as the cause of walkabout disease in horses. Further south it is considered to be harmless and quite a good fodder by some.

Lantana is another plant which appears to vary in toxicity according to locality and soil. Of the two recognised species which have been introduced into this country and have now become well established along the coast, one, the mauve-flowered variety (*L. camara*) is poisonous in North Queensland, but apparently is not so in the south. The reverse is the case with the red-flowered variety (*L. crocea*), which has been found to be non-poisonous in the North and poisonous in New South Wales. Whether this alteration in toxicity is due to change of soil and/or climate is not known, but it presents an extraordinary paradox.

Another plant, the ordinary linseed (*Linum usitatissimum*) has been found to vary in its hydrocyanic-acid content under different conditions of soil and locality.

The foregoing represent but a few examples.

(*b*) *Stage of Growth.*—Many plants contain toxic substances in the immature stage, but are quite good fodders when older. The various species of sorghums, Johnson grass and Sudan grass, are well-known examples. The ripe berries of ordinary white cedar (*Melia dubia*) are said to be more toxic than the immature ones, while the berries of some of the Solanaceæ are poisonous when green but quite harmless when ripe. The distribution of poisonous substances, of course, varies greatly according to the part of the plant selected, and naturally this in its turn, to some extent, at any rate, on the stage of growth. One has only to think of the many alkaloids which find a place in pharmacology, such as morphia, which comes from the opium of the poppy head, or cocaine from the leaves of a South American plant. The roots and bark of derris contain rotenone, a substance very largely used to destroy insect and allied pests, while the rest of the plant contains very little; and so on with many other examples.

It must be remembered that some plants contain their active constituents in a form other than that which produces its poisonous effects. Cyanogenetic glucocides as such do no harm, but under the influence of enzyme action hydrocyanic acid (HCN) is liberated.

Drought conditions which seriously affect the growth of the plant may be responsible for the increase in certain active constituents in the plant, this being particularly noticeable in plants of the HCN group. Plants of this group are specially dangerous in this respect—i.e., Johnson grass and the sorghums.

(*c*) *Light.*—The poisonous effects of some plants only develop when the animal is exposed to light, and then, as a rule, only on the white portions of the skin. This is due to the absorption by the white portion of the skin of certain of the elements of the spectrum, and these in their turn influence the sensitising agents which derive their origin from the plant. The condition produced is known as photosensitisation, and has been the subject of much investigation during the last few years. It appears that these agents are closely allied in their composition to the chlorophyll of the plant on one side and certain constituents of the protoplasm of the plant cells on the other. It was believed at one time that the production of sensitising agents was confined to a relatively

small number of plants and then under, as a rule, special conditions of climate, season, &c., the exact significance of which was not known. However, the recent outbreaks of facial dermatitis in New Zealand, which appears to be a form of photosensitisation, indicates that many plants are capable of producing sensitising agents and particularly in flush seasons.

(*d*) *Exercise* is necessary to produce the symptoms associated with poisoning by some plants. A number of well-known plants fall into this group, such as *Stachys arvensis*, the stagger weed, and the *Malva* or marshmallow group of plants. In the ordinary way these plants produce no effect on the grazing animal, but if driven they show trembling and staggering, and if driving is continued the animal eventually falls and is unable to rise.

(*e*) *Climatic Conditions.*—Mention has been made of the effects of drought and other conditions on the poisonous principle content of some plants, but there is one condition, i.e., tetany, which appears to be associated with the consumption, during certain seasons, of what are usually considerd to be otherwise good fodders. Tetany is believed to be usually due to a hypomagnesaemia or a hypocalcaemia—i.e., a decrease in the calcium and magnesium contents of the blood—or a combination of both. A good deal of work has been done on these conditions, particularly in Holland, during the last few years, and the relationship between the decreased amounts of magnesium and/or calcium in the blood and the particular foodstuffs consumed have not yet been determined. In Australia a condition of tetany is frequently seen in sheep and cattle which have grazed on oats or wheat which have been exposed to frosts. The condition, at least in Queensland, appears to be associated more often with a dry winter than with a wet one, though the wet winters frequently represent the years in which there is less frost, which may be an important factor.

(*f*) *Habituation* or *Tolerance* to plant poisons is probably not of very great importance from the practical standpoint, but it has a good deal of theoretical interest. I am not referring here to natural tolerance, which varies widely with the species of animal—and even within the species there are marked differences between the susceptibility of individual animals to plant poisons—but to acquired tolerance. In South Africa it has been shown that by repeatedly administering small quantities of sublethal doses of certain plants or the toxic products of such plants that it was possible to induce a tolerance whereby the animals were able to consume without ill-effects up to 800 times the minimum toxic dose.

The tolerance that is seen in human beings to certain plant alkaloids is well known, and there is no reason to doubt that under certain conditions animals acquire a similar degree of toleration, and a good deal of experimental work has been done along these lines, particularly with laboratory animals.

The opposite condition to tolerance is increased susceptibility. Whether this condition can be acquired is not yet known, but there appears to be some evidence that under certain conditions animals become particularly susceptible to the ingestion of certain poisons. It is known, of course, that with certain alkaloids, such as strychnine, there is evidence of an increased susceptibility following repeated small doses, but this, however, may be due rather to a cumulative effect than to a true increased susceptibility.

Poisonous Principles Found in Plants.

The poisonous principles of a great number of plants are as yet unknown. Apart from the plants which produce HCN in the animal body by virtue of the presence of what are known chemically as cyanogenetic glucosides which are broken down by enzymes or ferments in the animal body whereby the HCN is split off, there are a number of poisonous principles which have been isolated from plants and which fall into more or less well-defined groups.

(*a*) Alkaloids are among the most important. These are nitrogenous compounds with the reactions of bases, and so are able to combine with acids and form salts, such as sulphates, tartrates, acetates, and chlorides. They vary widely in their effects on the host, and many of them find extensive use in pharmacology.

(*b*) Glucosides are neutral in reaction and nearly always crystalline in structure and soluble in ether and alcohol. The most important from the point of view of plant poisoning are the nitrogenous glucosides, and among these the cyanogenetic which produce HCN. The amount of these glucosides varies widely in the plant and is governed by a number of factors, some of which are as yet unknown.

(*c*) Lactoresins or latex form emulsions with emulsifying liquids and appear to consist of a hydrocarbon and a resin which may also be combined with alkaloids, proteins, glucosides, phenols, &c. Their effect is mostly on the alimentary tract. Curare, the South American arrow poison, is a well-known example.

(*d*) Saponins are allied to the glucosides, and their composition is to a large extent unknown. It is worth noting that when taken via the alimentary tract they are relatively harmless, but via the peritoneum or directly into the blood stream they are extremely poisonous. It is said that when lesions, such as ulcerations, occur in the bowel wall saponins present in the food stuff have a much better chance of reaching the blood stream.

(*e*) Toxalbumins are analagous to the enzymes in many respects and also have some of the properties of albumins. Beyond this little is known of their composition, but they can, when introduced into the body in small doses, set up the production of antibodies. One of the best known examples is ricine found in *Ricinus communis*, the castor oil plant.

(*f*) Photosensitisation has already been mentioned, and the substances responsible appear to be related on the one side to the chlorophyll, the green colouring matter of the plant, and on the other to the haemoglobin, the red colouring matter of the blood, and certain other cell constituents.

Plants which Produce Deficiency Diseases.

These are really not poison plants in the strict sense of the word. Deficiencies in soil lead to the absence of certain essentials in the plant, and these in their turn to deficiency disease in the animal. The absence of sufficient phosphorus in many soils is well known and occurs all over the world. The accompanying disease of phosphorus deficiency has been studied in many species of animals. Within recent years attention has been drawn, particularly in Australia, to the absence of certain other elements in the soils and pasture and the accompanying diseases

they produce. The work on cobalt and copper deficiency in South and West Australia has attracted world-wide attention. As mentioned above, these plants are not strictly poison plants, but they are good illustrations of the manner in which a soil deficiency can be transferred via the plant to the animal economy with disastrous results to the latter, and wherein a group of diseased conditions is produced which is a direct contrast with another group of diseased conditions produced by excess of certain poisonous elements in the soil which find their way by the same route—i.e., via the plant to the animal economy.

Symptoms and Lesions.

Symptoms and changes produced in the animal body (lesions) vary widely and according to the plant and the animal. Certain classes of poisons act upon the digestive tract and the organs associated with it, some exert their influence on the respiratory and circulatory apparatus, others on the genito-urinary system, many on the nervous system, some on the sensory organs and skin, and so on.

Many of the known plant poisons affect the digestive apparatus. Those acting acutely produce diarrhœa, vomiting, and acute inflammation of the various parts of the tract. The more slowly acting ones, particularly those of a cumulative nature, act upon such organs as the liver producing, according to the degree of irritation, a subacute or chronic inflammation. Icterus—i.e., jaundice—is common with many.

General systematic or body poisons like HCN naturally produce very few symptoms and the lesions are almost negligible.

Many of the alkaloids have a special action on the circulatory and respiratory systems as well as the sensory organs. They do not, as a rule, produce marked changes in the body.

A large number of plant poisons affect the nervous system, the symptoms varying according to the particular plant and poison. On the brain they may produce excitement or the opposite effect—depression. The spinal cord and nerve endings may also be affected with contraction of muscles, either singly or in groups or over a wide area, trembling, convulsions, tonic and clonic spasms, tetany, &c.

Some of those affecting the respiratory apparatus produce profound changes in the lungs. One or two of these are of importance in Queensland.

Circumstances in which Poisoning Occurs in the Field.

This is the important phase of the subject from the point of view of the stockowners, and in discussing it we propose to select a few of the best-known plants known to be poisonous in this State and deal with each one in turn.

1. *Lantana.*

The first plant to consider is the common Lantana, an introduced plant which has established itself along the whole of the coastal area of Queensland, particularly on the rich soils of the sugar districts of the North, but it is also to be found in many of the lighter soils. Once established, it tends to take charge and choke out many other plants.

The first evidence we have regarding the poisonous nature of the Lantanas is found in a report by the late Mr. G. Tucker, Deputy Chief

Inspector of Stock of Queensland, and is dated 1911. Mr. Tucker was investigating a condition known as "pink nose" in cattle at Cairns. This disease is associated with loss of condition, marked constipation, and jaundice, which may be intense. The muzzle is swollen and often cracked and is of a dark-blue or pink appearance, hence the name. The condition was noted mostly in cattle brought from inland areas to the coast for slaughter purposes, hence was frequently seen in bullocks running in butchers' paddocks. Many of these paddocks about Cairns were overrun with lantana and had very little grass. By feeding tests, Tucker showed that lantana was responsible for the condition, but his report is not very clear regarding the species.

In this State there are apparently two varieties, one with a lighter green leaf, rougher stems, and yellow and red flowers, the second with a darker leaf and mauve and cream flowers.

In North Queensland, as mentioned earlier in this article, it was considered that the yellow-red variety was the more poisonous of the two, and this received support from some experiments carried out in New South Wales. However, feeding tests which have been carried out in North Queensland on more than one occasion have shown that the mauve-flowered species is very poisonous, the feeding of even a few ounces of the plant producing symptoms in calves, while the yellow-red-flowered variety, even in considerable quantities, produced no ill-effects.

Lantana poisoning is of considerable economic importance at times, for although it does not produce, as a rule, high mortality, the loss of condition and the unsightly appearance of the flesh due to the jaundice causes many bullocks to be rejected in the meatworks. On one occasion some years ago over 100 otherwise first-grade carcasses of beef at Alligator Creek meatworks, Townsville, had to be graded as third grade because of the yellow discolouration.

2. *Hoya australis.*

This is a fleshy climber with white flowers, which are sweetly scented. It occurs along the coast but is also found inland, particularly in the brigalow scrubs. It is known as "Hoya" or "Wax" flower.

It has long been regarded as poisonous, but was only recently tested at Yeerongpilly, the plants being obtained from Taroom. Force* feeding of the plant to two wethers produced symptoms. One was sick within twenty-four hours of consuming a pound of the plant, the second wether showing symptoms after eating 3 lb. over a period of three days. A third wether showed symptoms after being drenched with watery extracts from 2 lb. of the plant.

A peculiar symptom noticed with one of these sheep was the assumption of a kneeling position. This is said to be noted also in both sheep and cattle poisoned under natural conditions.

As stock losses occur in animals which are being driven through brigalow scrubs, especially along roads where little feed is available, it is obvious that such stock routes should be avoided as much as possible,

* Force feeding means forcing the ground-up plant into the animal's mouth in small balls. By such means considerable quantities can be taken.

and where this is impracticable the animals should be kept away from the plant as much as possible. This is possible at times, for the plant appears to grow in patches.

3. *Passiflora alba.*

Known as the "Wild passion vine," this is a native plant occurring on the coast or thereabouts. The flowers are white.

The plant is quite common about the Rathdowney and Beaudesert districts, where it came under suspicion many years ago as being the possible cause of mortality among dairy cows and also among working bullocks.

In dairy cows it was noticed that the affected animals stood about under the trees and did not graze out with the others, nor did they ruminate. There was marked reduction in the milk yield in lactating animals, also loss of condition. Convulsions and fits were not infrequently seen in the last stages of the disease. It was noticed that animals very frequently recovered if the pasture was changed.

Feeding experiments, carried out by the late Dr. Sydney Dodd in 1910 and fully reported at the time, with the succulent tops of the vines at Yeerongpilly produced all the symptoms of the disease as seen in the field. It was also noticed that symptoms were not produced until at least fourteen days after feeding commenced, thus suggesting that the poisonous principle is of a cumulative nature. (See "Q.A.J.," 1910, page 88.)

4. *Trema aspera.*

This is a shrub common as a secondary growth found both along the coast and inland but more frequently on the coast. It is known as "Poison Peach."

For many years this plant has been regarded as poisonous to stock, and it was generally believed that this was due to a prussic acid (HCN) glucoside. Tests carried out at various times have failed to produce evidence regarding the presence of HCN.

Extensive feeding tests have been carried out in both North and South Queensland with the green leaves of this shrub, and with positive results in all cases. Thus a two-year-old steer at Townsville died after consuming 18 lb. and a second after consuming 6 lb. One sheep consumed 4 lb., a goat 2½ lb., while another sheep was drenched daily for four days with the watery extract obtained from 1 lb. of the minced plant; death followed in each case.

The symptoms noticed were dullness, loss of condition, and evidence of pain. With one steer it was noticed that the animal kept its head lowered and its muzzle in contact with the ground.

Post-mortem does not show anything characteristic. There is no doubt, however, that the poisonous principle is not HCN.

5. *Verbesina encelioides.*

This is an introduced plant which has adapted itself to Queensland conditions, and is now widely spread throughout various parts of the State. It is particularly prevalent in the Lockyer district, parts of the Downs, and the Maranoa. It is known as the "Wild Sunflower," is an annual, often weedy in nature, and about 2 to 4 feet high. In cultivated areas it is a bad pest.

It has been suspected on various occasions of causing death in both sheep and cattle. It is, however, a plant that is not likely to be eaten in the ordinary way by stock because of its woody and fibrous nature, and it has usually come under suspicion where stock have been turned on to pasture containing much of the plant in dry times when other feed is not very abundant.

Drenching experiments with watery extracts of the plant have shown that it contains a toxic principle, and sheep have been killed in twenty-four hours after administration of a single dose obtained from a pound of the minced plant. Experiments with bovines have been limited and have not given conclusive results, but there is no doubt that the plant is consumed not infrequently by cattle in sufficient quantities to cause death.

The toxic principle causes an acute gastro-enteritis and, in addition, an acute congestion of the lungs and a marked oedema of the lung tissue. This peculiar lesion makes the diagnosis of poisoning in the field relatively easy.

The poisonous properties of this plant have been investigated in New South Wales, and the details of their results can be found in the Veterinary Research reports from Glenfield (No. 7, page 89).

6. *Salvia reflexa.*

This is an introduced plant and is now well established in parts of Queensland and tends to spread. It has covered some of the best parts of the Darling Downs. It is known as "Wild Mint."

Like many other plants, it is usually not touched by stock unless they happen to be hungry, when it may be consumed in considerable quantities. Its poisonous properties appear to depend upon the high nitrate content, a quality which appears to vary according to the seasonal conditions prevailing at the time. The nitrate is reduced in the animal's body to nitrite by enzymic action, and this nitrite acting upon the haemoglobin or red colouring matter of the blood produces a substance known as methaemoglobin. By this the oxygen carrying capacity is reduced. The post-mortem is characteristic in the fresh carcass, the blood being a distinct chocolate colour, which pervades all the body organs.

Disastrous losses have been at times associated with this plant. Some years ago a mob of some 1,000 bullocks, which had passed over part of the Darling Downs that had been eaten out, then travelled along a lane for several miles where this plant was growing profusely. No less than 300 of them died.

7. *Salvia coccinea.*

This is another member of the salvia group which is a garden "escape" and has established itself in various parts of the State. It was definitely poisonous when tested on sheep and cattle, but the plant has also been accused of causing abortion in cows. The field evidence in this direction is particularly strong, and for this reason farms where the plant has established itself in the last few years have greatly depreciated in value. Experiments have not yet proved whether it is correct to regard the plant as one capable of producing abortion, but these are about to be conducted shortly, using pregnant cows as experimental animals. By this means it is hoped to settle the question. The fact remains, however, that the plant is definitely poisonous to sheep.

This plant has also been reported as poisonous in New South Wales (Glenfield reports No. 7, page 118).

8. *Threlkeldia proceriflora.*

Known as "soda bush," this is a native plant a few inches to one foot in height. It is very common in the western sheep country and is also found in New South Wales and South Australia. It is particularly abundant in the black-soil areas, where in some cases it constitutes 90 per cent. of the cover.

Notwithstanding the fact that the plant is widespread and has undoubtedly been the cause of heavy mortality in the past, it did not cause undue suspicion until quite recently. It is a plant not readily eaten in the ordinary way by sheep, and all observers agree that when the animals are allowed to graze quietly they ignore the plant. When, however, sheep have been trucked and not fed for periods of forty-eight hours or more, or when they have passed over several miles of a bare stock route, they readily eat the plant if it is available.

A peculiar characteristic of sheep dying after consuming this plant is the fact that many of them are found dead lying on their briskets with the head stretched along the ground. In most other conditions dying sheep lie over on their sides before death and are found in this position, but this is not always so in soda-bush poisoning. It is a point which assists greatly in diagnosing the condition.

It is worth noting that places like the Longreach common are covered with this plant, and it is well known that for years many graziers untrucking valuable sheep have taken the greatest precautions in driving sheep across this common, yet until quite recently this plant was not even suspected. It was only a little more than a year ago that the Longreach stock inspector suspected this plant as the probable cause of trouble in his district, and on further investigation his suspicion was confirmed. (See Aust. Vet. J. of 1939, page 168.)

9. *Wedelia asperrima.*

This is a native plant known as the "yellow daisy" and grows on the black-soil sheep country at Hughenden, Richmond, and Cloncurry.

Like many other plants we have mentioned, it is not readily eaten by sheep in the ordinary way, for sheep bred on a property where the plant is common suffer no ill effects. Introduced sheep, however, frequently consume the plant with fatal results.

When enough plant has been consumed—and a few ounces is often sufficient—the condition runs an acute course. The animal is obviously ill and takes no notice of its surroundings. There is marked uneasiness to be soon followed by a comatose condition. Spasms of the muscles may be noticed just before death.

Post-mortem shows an acute inflammation of the stomachs and first part of the bowel, and also a marked congestion of the lungs, a condition we have already noted in another species, *Verbesina encelioides*, which is closely allied to *Wedelia*.

The testing of this plant was conducted at the Animal Health Station, Oonoonba, Townsville, North Queensland (see "Q.A. Journal," October, 1939).

10. *Brachyachne convergens.*

This is one of the couch grasses. It is a native plant and is fairly widely spread in the eastern parts of Queensland. It had not come under suspicion until quite recently, when it was found to be very common along a certain stock route near St. George. Heavy losses of travelling sheep had occurred at various times along this stock route since the previous wet season and an investigation by Mr. Francis, one of the Government Botanists, showed that this plant was growing profusely in patches and had been consumed by the sheep. Examination also revealed the fact that the HCN content of the plant was very high, and since the animals were showing unmistakeable evidence of HCN poisoning, there seems to be little doubt that this plant was the causal agent.

It represents one of the most recent additions to poison plants of this State.

11. *Swainsona luteola and galegifolia.*

I have placed these two plants together; the first has been strongly suspected and the second is the well-known Darling Pea. It appears that animals acquire a taste for these plants, and when once this is fixed they prefer to eat them, leaving other good pasture alone. It has not yet been definitely proved in this State that *S. luteola* is poisonous, but the field evidence in this direction is very strong. When affected the animal is said to be "pea-struck."

Unlike many other plants we have mentioned and which kill the animal in a relatively short space of time, the two plants mentioned above do not produce symptoms until the animals have been feeding on them for some weeks—i.e., the poison, whatever it is, appears to be of a cumulative nature. The first symptoms noted are those of a nervous nature; there is trembling of the body, stupidity, and loss of alertness. The animal becomes clumsy and unsteady in its gait. It may fall but soon regains its feet in the early stage of the disease, but has greater difficulty in rising as the condition progresses. If the animal is driven, the symptoms may be greatly aggravated, but if left alone may take some weeks before death ensues. (See Agric. Gazette of N.S.W., 1917, page 735.)

12. *Atalaya hemiglauca* (Whitewood).

A small native tree very widely spread throughout North Australia.

By many it is regarded as quite good fodder for cattle and sheep, but its association with the well-known "walkabout" disease of horses of the Gulf country and the Northern Territory was proved some years ago by investigators working in the latter territory.

The poison is cumulative and animals do not exhibit symptoms until they have consumed considerable quantities. So far as is known, once symptoms have developed, no animal has been known to recover. The symptoms are quite characteristic, the animal seems to have lost to a very large extent its sense of direction and is unable to recognise obstacles. It staggers forward blindly and cannot be restrained unless by force. The consequence is that, as the beast becomes weaker, it frequently finishes by becoming entangled in a wire fence or else staggering into a lagoon and there being drowned. Another peculiar symptom is that if the animal has been used to pasturing near a habitation it moves in that direction and attempts to enter by forcing its way through doors or openings.

The lesions are characteristic. There is frequently a greatly distended stomach due probably to early paralysis and the liver shows marked degeneration changes.

The condition is very prevalent in the Gulf country and appears to be worse in some years, when it is responsible for very heavy losses.

The fact that the poison is cumulative and does not produce symptoms until lesions must be well advanced means that the animal may be removed some weeks from whitewood country before symptoms are observed.

Extensive experiments with this plant were carried out by officers of the Council for Scientific and Industrial Research and the results published in their Bulletin No. 36.

13. *Terminalia oblongata* (Yellowwood).

This is a small tree found throughout central Queensland. It was generally regarded as the cause of fits or shivers in sheep for many years before the work of McIntosh and Stewart confirmed these opinions. During the late winter particularly the plants shed their leaves and in dry times these are readily eaten by the sheep. Small branches, too, are frequently broken from the trees and from these the leaves are plucked by sheep.

On experiment it was found that the symptoms which consisted of fits were produced in three to four days after feeding on 1 lb. of the leaves mixed with chaff per day. These fits come on particularly if the sheep are approached by strangers and attempt to run away.. McIntosh says: "The sheep drops in its track as though stunned and lies trembling with the extension muscles of the neck and limbs strongly contracted. The animal sometimes lies prone or may raise its head and sway it from side to side. Recovery is usually quick and in less than a minute. The sheep is able to rise, then sway a little, and finally runs off to join the mob. Strangers, loud noises, dogs, and driving all help to bring on the fits. Some animals, after recovery from fits, do not seem to be affected by driving" ("Q.A. Journal," 1934, page 727, where the tree is referred to as *Terminalia bursarina*).

SCIENCE SOLVING THE GRAZIER'S PROBLEMS.

Only towards the close of the last war was the value of scientific research in times of emergency fully appreciated, but during the present war its essential service has been recognised in Australia as well as in Great Britain. To-day, work undertaken in many fields of investigation is being continued. Included in that work are projects for improvement in the pastoral industry and the wool clip. Some recent discoveries include a method of treating jaundice in sheep, a treatment for internal parasites in sheep, a system for the elimination of foot-rot in sheep—which has been found to be solely due to germ infection—and a process for making wool unshrinkable.

Other inquiries, nearing successful results, are being made into blowfly strike and other problems, and it is certain that the general adoption of the methods already proved of use will result in improved health of sheep and a better wool clip —a matter of importance to the country as well as to the individual grazier.

Continuance of scientific research such as this must contribute largely to Australia's successful sharing of the burdens of the war.

A Dairy Building Plan.

P. ROUND, E. B. RICE, and L. E. NICHOLS, Dairy Branch, Department of Agriculture and Stock.

NOW that steam sterilization is compulsory under *The Dairy Produce Act* on any dairy operating a mechanical milking plant, it is desirable, especially on the larger farms, to so plan the farm buildings that most of the dairy work can be done under the one roof, if at all practicable or convenient.

To conform with progressive changes in the dairying industry, an experimental shed of a design calculated to provide simplicity of working, while at the same time complying with essential sanitary requirements, was built on the farm of Mr. R. L. Kemp, of Ascot, near Greenmount, Darling Downs. (Plates 3, 4, 5, 6.) The chief features of the layout of a milking shed and yards, covering the requirements of regulation dairy buildings, are:—

(1) The dairy section of the building—comprising (*a*) engine room, (*b*) separator room, (*c*) milk or cream storage stand, and (*d*) wash-up area—is attached to and under the same roof as the milking bails; and

(2) Concreted areas at the entrance to and exit from the bails up to a distance of 30 feet from the dairy section of the shed to provide a clean approach for stock.

After eighteen months' experience, Mr. Kemp has expressed complete satisfaction with the shed and yard layout as to the practicability and advantages of the plan. Forty other dairy farmers on the Downs, who were impressed with the practical benefits of the plan, have since built or converted their milking sheds along similar lines.

Plate 3.

A GENERAL VIEW OF THE SHED AND IMMEDIATE ENVIRONMENT.

Advantages of the Combined Building.

The advantages of what is described as a combined dairy building in comparison with the detached dairy buildings formerly stipulated are:—

(1) Building costs are lower.

(2) Contamination from certain sources (particularly manurially-laden dust from the cowyard) is minimised.

(3) The milking and subsequent operations are more conveniently performed.

(4) Steam sterilization can be more efficiently applied.

(5) The extension of the use of refrigeration on dairy farms will be facilitated.

These points will now be discussed in order:—

(1) *Cost.*—The cost of dairy buildings can be reduced by adopting the type of shed described, particularly by cream suppliers, for the expense incurred in erecting the dairy house (A), which is necessary if detached dairy buildings are preferred, represents an outlay which could otherwise be spent more usefully in improving the design of the milking shed.

(2) *The Minimising of Dust Contamination.*—This also is an objective with the ordinary layout of dairy buildings, but in practice it is not always achieved because of the tendency to deviate from prescribed standards. These may be considered by the farmer to be minor deviations —such as storage of utensils and equipment in a room adjacent to the bails without any regard for layout of yards to offset dust (often dessicated manure)—but these deviations may have a marked effect on the quality of dairy produce. In the layout described, the cowyard is at the side of the shed, and cattle will be on concrete as soon as they come within 30 feet of the dairy, consequently the dust nuisance will be considerably mitigated.

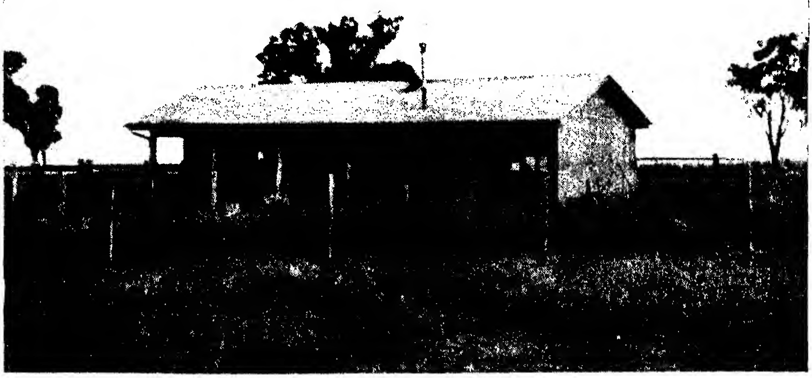


Plate 4.

THE SHED FROM ANOTHER ANGLE, SHOWING GRASSED AREA FENCED OFF FROM STOCK.

Plate 5.
A CLOSE VIEW OF THE SHED, SHOWING EXIT RACE AND LOUVRES IN ENGINE ROOM.

(3) *Convenience.*—The convenience and the saving in labour and expense through being able to carry out all operations in close and orderly sequence should be appreciated by all dairy farmers and should tend to more careful methods in production.

(4) *Steam Sterilization.*—The buildings previously specified require a division of cleansing operations—the milking machine at the milking bails and the remaining utensils at a wash-up room 30 feet away. The primary purpose in instituting compulsory steam sterilization was to ensure the maintenance of hygienic standards for milk and cream produced by mechanical milking, but the division of the cleansing

Plate 6.
THE SHED AND DAIRY HOUSE FROM THE STOCK-FREE ENCLOSURE.

operations between two places 30 feet apart is inconvenient where a sterilizer is installed, and thus may react against the most efficient application of steam sterilization. A major aim in the design of the new building is to simplify cleansing.

(5) *Farm Refrigeration.*—The new design facilitates the use of refrigeration for cream storage, which is already being applied by some producers and which, if a permanent quality improvement is to be attained irrespective of seasonal conditions, may be adopted generally. Cream storage adjacent to the separator room will enable refrigeration plants to be driven by the same motive power as is used for milking machines.

In the past it has been the practice to require the erection of a suitable building, situated at least 30 feet away from the assembly yard, to be used for straining, aerating, or separating milk, and for storage of milk, cream, and utensils, thus removing the milk as soon as possible after it leaves the udder, and storing it, or the cream separated from it, and the utensils a reasonable distance away from possible sources of contamination. A concession allowed in the case of a dairy operating a milking machine permits the separation of milk in a suitable room adjoining the bails, provided a 6-foot air space is placed between the separator room and the first bail. Milk or cream storage and washing and storage of utensils, however, has still to be provided for in a detached building 30 feet away from the bails.

Factors Governing Choice of Layout.

Although the combined dairy building is mainly adaptable to farms with large machine-milked herds, it may also be used on farms on which hand milking is the practice. However, for small dairy farms on which up to, say, twenty cows are milked, the detached dairy house (A), with veranda used as a combined separator and wash-up room, may be preferred. In order to comply fully with *The Dairy Produce Act* on an established small farm where the yards and milking bails are already in existence, but where a dairy house has not yet been provided, the erection of the dairy house (A) would perhaps involve the farmer in less expenditure than to convert the existing yards and building in accordance with the new layout. Even for large farms operating a milking machine the new combined building is not intended to entirely replace the previous regulation buildings, but the plan is offered as an alternative design, and farmers are at liberty to build or convert to this layout, or to erect detached buildings, according to their individual preference. The ease with which it is possible with the new building to change over from hand milking to the use of milking machines should, however, be borne in mind by anyone contemplating the erection of new buildings and who is likely at some future date to instal a milking plant.

For example.—If hand-milking sheds are erected, or converted, to the new layout with the cowyard at the end of the bails, the shed is projected towards the dairy house. Assuming that the shed is 15 feet long, the dairy can be built in line, 15 feet away. Should a milking machine be installed later, the buildings can be connected by constructing the engine and separator rooms between them. In the meantime, a considerable saving of distance has been effected, with no diminution of efficiency, as the dairy is still 30 feet away from the yard. (See Plate 7.)

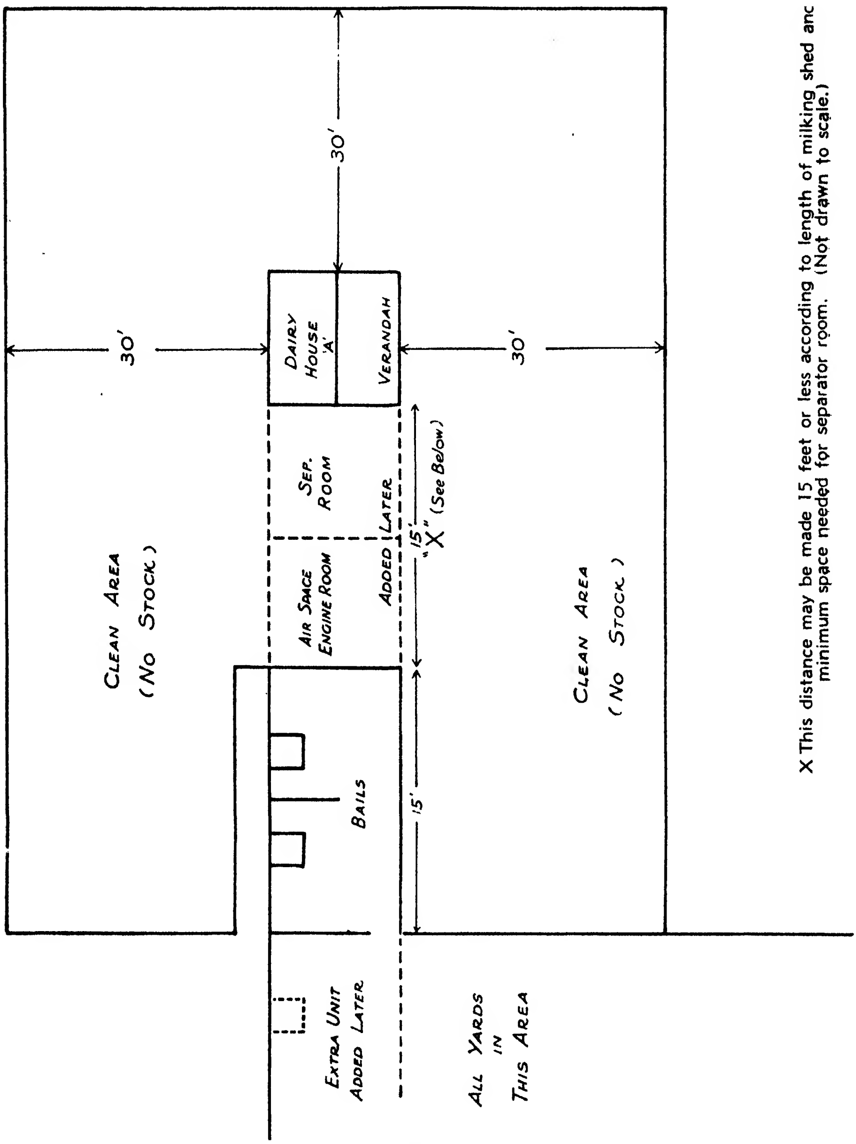


Plate 7.

With the "walk-in and walk-out" bails, should it be necessary at any time to extend the shed for machine milking, the additional bail units may simply be projected in the direction of the holding yard.

Notes on the Layout.

The impression may be gained that the building of a single shed in which all work can be done and cream storage provided for would entail the laying down of an area of concrete (or other material impervious to water) approximately 30 square feet in front of and behind the bails as shown in Plate 8.

The concreted area, however, can be reduced to any scale suitable to individual premises. For instance, the 30 feet by 30 feet area at the exit of the bails is best reduced to a crush not more than 4 feet wide. With such a crush it is, of course, necessary for all the doors to open in one direction and to be of such a width as to prevent cows from turning back. The action of the doors is to turn the cows as they leave the bails in the desired direction towards the race outlet; on closure the gentle push on the rump hastens exit. The 30 feet by 30 feet area in the assembling yard can be reduced to any width desired, or it can be entirely eliminated by having the yard at the end of the bails and permitting the cows to enter the bails from the end. Experience has shown that if a small holding yard is provided, as shown in sketch No. 3, the cows will walk in and out of the bails undeterred.

It may be claimed that delay will occur in milking a large herd through having to admit each individual cow to the bails, but, if desired, in order to allow a number of cows to be enclosed at a time in a small yard preparatory to milking, a strip of concrete, say, 6 feet wide in front

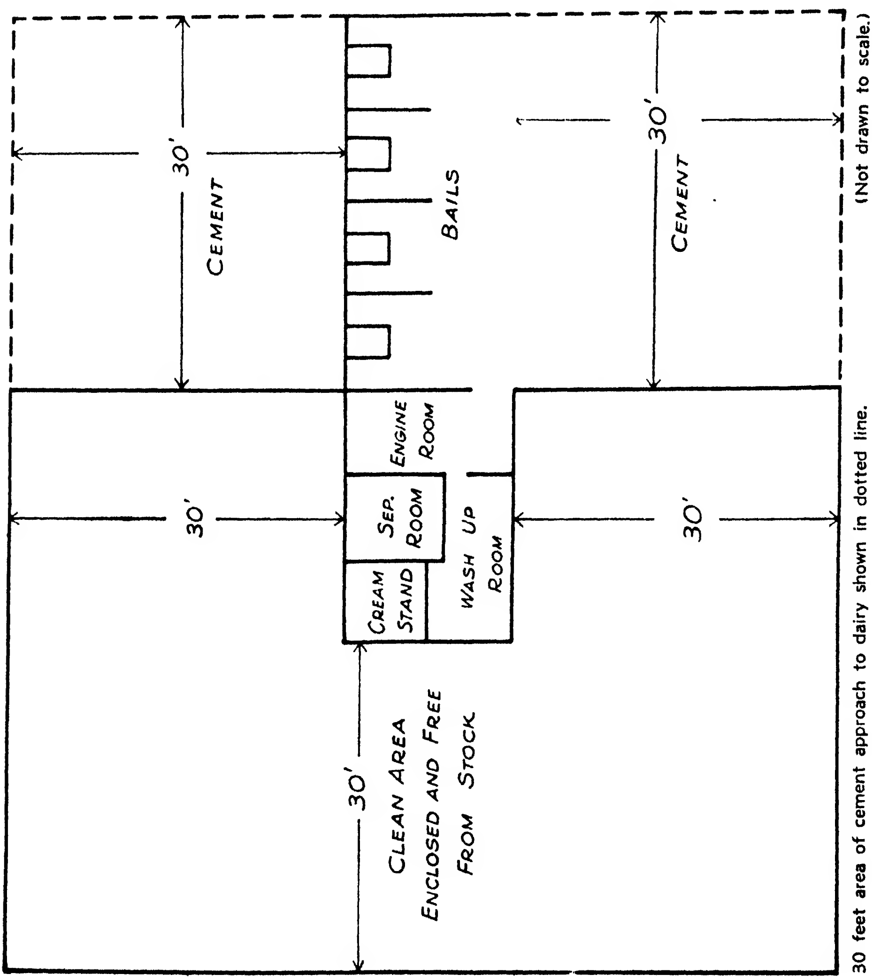
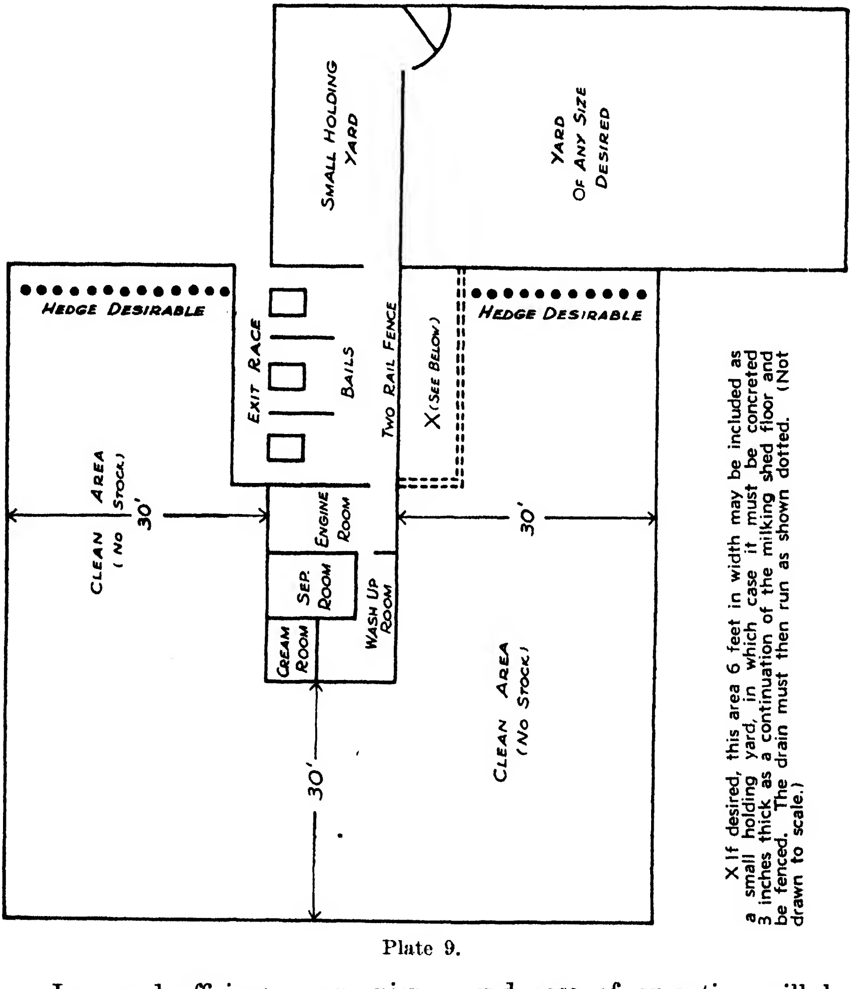


Plate 8.

of the bails, as indicated in Plate 9, could be provided. With such a small waiting area, running the full length of the bail portion of the shed, ten or a dozen cows could be driven in at a time and it will be found that, in most cases, cows waiting in this small area facing the bails are ready to walk in to the bail of their own accord as soon as they see the door opened to let a milked cow through.



X If desired, this area 6 feet in width may be included as a small holding yard, in which case it must be concreted 3 inches thick as a continuation of the milking shed floor and be fenced. The drain must then run as shown dotted. (Not drawn to scale.)

Plate 9.

Increased efficiency, convenience, and ease of operation will be achieved if, where the 6-feet concrete strip in front of the bails is provided, shed posts are dispensed with—supporting posts to be arranged and included in the leg-rope posts of bails. This gives a clear floor space. The bail roof could be shortened, and lowered to give protection from driving rain, as shown in Plate 10.

Having the holding yard at the end of the milking shed is emphasised as a feature of major importance in the new layout. This is much preferred even to a large concreted yard in front of the bails, for, unless this yard is properly cleaned daily, it can also carry very large quantities of manure-laden dust. The layout, by keeping the drainage and cow

ILLUSTRATING CANTILEVER TYPE OF BAIL ROOF. A 4-FEET OVERHANG CAN BE SAFELY CARRIED.

(Not drawn to scale.)

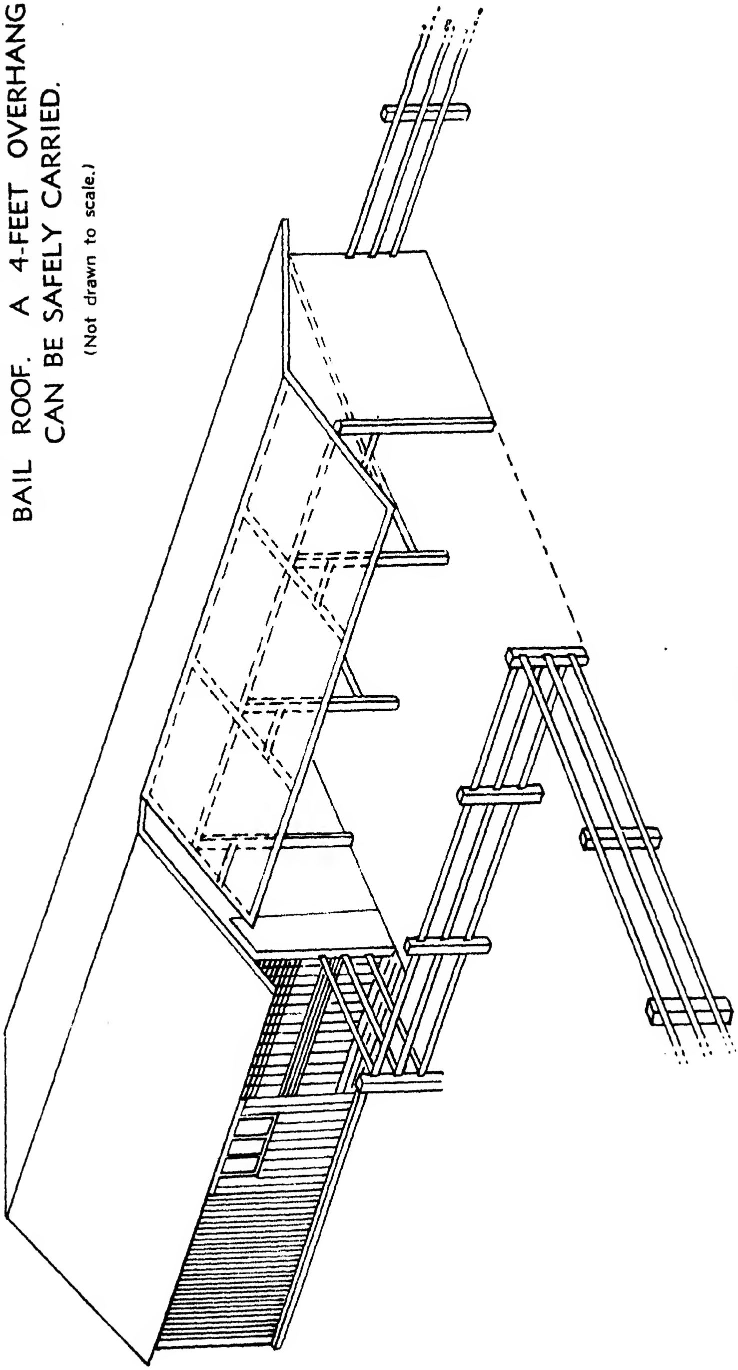


Plate 10.

yard (which inevitably becomes heavily contaminated with droppings, thus impregnating the soil with harmful organisms which, if they gain access as dust to either milk or cream, are most deleterious to its quality) at one end of the shed and the separating, cream storage, and utensils portions at the opposite end, is conducive to high-quality production. Numerous tests of milk supplies and visits to farms have revealed frequently the effects of contamination with manure-laden dust. The new design provides for the keeping of utensils and stored cream at a distance from the dust-polluted atmosphere of the yard. In comparatively wet coastal districts a draining shed could be provided at the end of the bails, with a sunny northerly aspect. A windbreak or hedge along the yard end of the bails will further minimise yard-dust contamination of the dairy equipment and the milk and cream storage area. The establishment of grass or lucerne plots in the "no stock" areas around the dairy is recommended.

It is the experience of farmers, who have built new or converted existing sheds in accordance with this combined dairy plan, that cattle quickly become accustomed to the system and no difficulty has arisen, even with heifers in their first lactation, in working the cattle in and out of the bails. On the contrary, many have claimed the heifers are less troublesome than in the old style of bails.

In the plan the following features, which are optional, have been incorporated and are suggested as a means of increasing efficiency:—

In the bails, sliding seats may be fitted in each dummy bail for convenience and sanitation.

The use of sheets of galvanised iron, which can be washed down easily, used for lining the side walls of the bails, and on which manure may be splashed, would be an advantage in ensuring greater cleanliness; or, alternatively, concreting up to about 3 feet for the side walls is recommended.

It will be observed that the dummy bails, instead of being fitted into the floor, are suspended from the rafters, thus facilitating the cleaning of the concrete floor of the bails. Although the depth of the dummy bails is shown as 4 feet 6 inches, it is permissible to reduce this depth. For instance, 3 feet 6 inches is deep enough for most cows, for it is only necessary for the head and forequarters to be in the bail and the cows can be securely held in position by adjusting the breeching rope.

By installing the engine and vacuum pump in the air space—which may be adequately ventilated by louvres fitted to a height of 3 feet 6 inches in each end wall—space is economised. This room also provides a "buffer area" between the place of milking and the place where milk is handled.

Summary.

(1) A dairy building which, without disturbance of Regulations requirements will enable all operations to be conducted under a single roof, has been designed.

(2) The conduct of all operations—cleansing of utensils, steam sterilization, and the storage of equipment and dairy produce—in close proximity is advantageous where machine milking is an everyday practice.

(3) Building expenses are curtailed.

(4) The separation by a reasonable distance of the dairy section of the shed from the areas from which contamination by cowyard dust and manure is possible is achieved—hence protection of quality in the product.

(5) Dairy cows soon become used to the new layout.

(6) The layout is effective in the diminution of the contamination of milk and cream during and after milking.

(7) In addition to its use in operating the milking machine, the motive power is available for farm refrigeration which is practicable in the shed.

Conclusion.

That the quality of dairy produce is governed chiefly by the personal equation, or the appreciation by the producer of what constitutes dairy hygiene, rather than by the standard of dairy buildings and equipment or the design of sheds and yards, does not require stressing. However, the layout described in this article, and which is conducive to efficiency because of its convenience and its simplification of dairy and cleansing procedures, should be acceptable to the producer and will also enable the objective of the *Dairy Produce Act* to be reached.

Plans of the combined dairy building have been made available to dairy inspectors, from whom any dairy farmer who is interested should make further inquiry.

SELF-CLOSING YARD GATE.

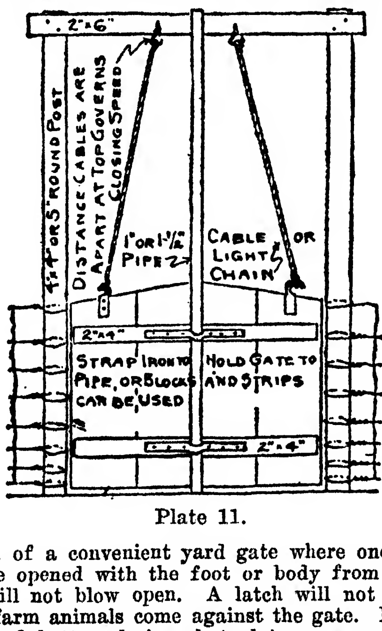


Plate 11.

Here is a diagram of a convenient yard gate where one has to pass back and forth often. It can be opened with the foot or body from either direction and is self-closing, and yet will not blow open. A latch will not be needed for poultry, but should be used if farm animals come against the gate. Boards are used to give a little more weight and better closing, but slats or woven wire may be used if preferred. Putting the chains farther apart at the top increases the speed at which the gate closes.

Gherkin Growing.

W. J. ROSS, Senior Instructor in Fruit Culture.

AMONG the many small crops that can be grown in the central and southern coastal districts of Queensland are gherkins. Before the outbreak of the present war large quantities were imported by Australia from European countries in barrels containing brine, but since this trade has been cut off opportunities have arisen for local growers to develop a new industry. New South Wales has produced a small tonnage annually for some years and growers there are being urged to increase their output, as the present production provides only a small percentage of the Australian demand. One Sydney firm alone can handle 100 tons a year, while there are smaller firms in Queensland and other States seeking supplies. It is advisable, however, for farmers who are interested to enter into arrangements with a pickling firm to take the crop under contract before deciding to plant an area.

For best results, the vines require to be picked over every day. The companies pickling gherkins pay according to the grade of the product and small sizes are worth more than the larger fruits. Sizes and prices vary with different buyers. For instance, some firms pay 4d. per lb. for top grade and others 6d. per lb. While 1½ inches is considered by some the best size, others affirm that 1¾ inches to 2 inches will return the best price. Hence the advice to intending growers to enter into a contract to grow for a particular firm.

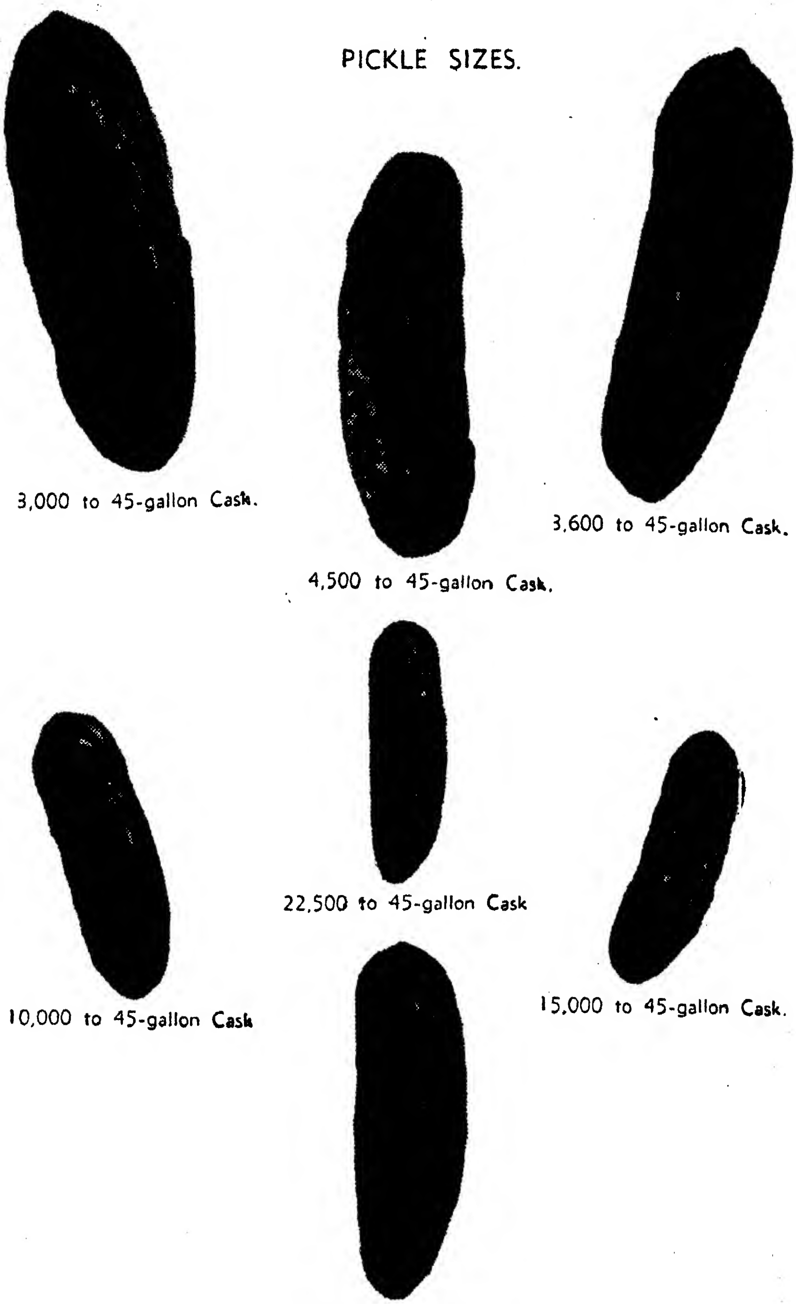
It is essential that gherkins when picked should be placed immediately into a barrel and completely covered with brine made from 2 lb. of salt per gallon of water. Most firms supply casks (about 45 gallons capacity) on loan and sometimes salt for the brine also is supplied. Usually grading is done at the factory, so the grower is saved this expense. The average yield per acre is stated to be about 1½ tons, and the average gross return between £40 and £50. Two acres are probably as much as one man could comfortably handle in a picking season.

Gherkins are susceptible to damage by frost, and if the site intended for planting is one liable to cold, planting should be delayed until all risk of frost has passed. Otherwise, the sowing of seed may be commenced in the late winter and continued until March. Fertile, well drained loamy soils are most suitable. If the soil is not very fertile, well-rotted animal manure (if available) should be worked in where the seed is to be sown two or three weeks beforehand, while at time of sowing an application of commercial fertilizer, such as one used for cucumbers, should be placed under the seed. Five to 8 cwt. per acre would ensure good results, particularly if followed by a side dressing at the rate of 2 cwt. to 3 cwt. per acre when the plants commence to run.

Water for irrigation is more or less an essential requirement, as the plants must be kept growing continuously.

Seed may be sown either in drills or in "hills." If the former method is adopted, the drills should be 6 feet apart and the plants thinned to 12 to 18 inches apart in the rows. If sown in hills, the hills may be made 4 feet apart each way and six seeds sown in each. The resultant plants should be thinned later to two or three to each hill. Thinning should not be done too early, and sufficient time

PICKLE SIZES.



3,000 to 45-gallon Cask.

4,500 to 45-gallon Cask.

3,600 to 45-gallon Cask.

10,000 to 45-gallon Cask

22,500 to 45-gallon Cask

15,000 to 45-gallon Cask.

6,300 to 45-gallon Cask.

Plate 12.

should be allowed the young plants to grow so as to be able to distinguish the weak from the strong. At the five or six-leaf stage is a good time to thin.

It is advisable to treat seed before sowing by immersing it in a solution of one part of corrosive sublimate to 1,000 parts of water for five minutes, then wash it in clean water, and dry before planting. Seed treated in this way should be sown soon after drying, and therefore treating of more seed than can be sown quickly should be avoided.

During the warmer months, close planting in rows has advantages because the thick green foliage prevents the soil becoming too hot, and lessens the evaporation of moisture from around the roots. If the soil is warm and contains reasonable moisture, good germination should follow. On the other hand, if cold, wet weather is experienced at time of sowing, there will be a certain amount of seed-rot and slow germination.

Cultivation consists of the suppression of all weed growth and the loosening of the surface soil by shallow cultivation while this is possible. Since the roots do not penetrate deeply into the soil, deep cultivation close to the plants would cause injury to the roots, and would destroy many root hairs on which the plants depend for sustenance. Shallow and frequent cultivation is the best means for conserving soil moisture. It is not advisable to work among the plants when they are wet as this may tend to spread disease.

Should the plants send out "runners" to a length of 3 feet, and there are no signs of fruit setting, it is advisable to snip off the terminals of the runners with a sharp knife, so as to induce further branching and fruiting. When the young fruits have set and are visible, stopping excess terminal growth will aid development and also help to regulate and equalise growth.

As already stated, picking should be continuous throughout the life of the plant. It is important that the fruit be not allowed to remain on the vines to mature seed as the product will not then be first grade and, furthermore, the vines will more rapidly deteriorate and the yield will be lessened.

Gherkins should be as uniform in girth from end to end as possible. Bottle-shaped fruit or club-shaped fruit usually called "nubbins" are not worth as much as uniformly shaped fruit.

Varieties suitable for pickling are "Heinz Early Pickling," "Boston Pickling," and "Naylor's Smooth." Seed is not obtainable everywhere, but is stocked by the large seed merchants. The varieties known as "West Indian" or the wild gherkin are not required by manufacturers and should not be grown.

Mr. J. D. STORY, I.S.O.

An Appreciation.

IN his annual report, the Public Service Commissioner, Mr. J. McCracken, pays an impressive tribute to his predecessor, Mr. J. D. Story, I.S.O. The office of Public Service Commissioner, he said, was established in March, 1920. Mr. Story, the first Commissioner, continued in office until his recent retirement. Continuing, Mr. McCracken said:

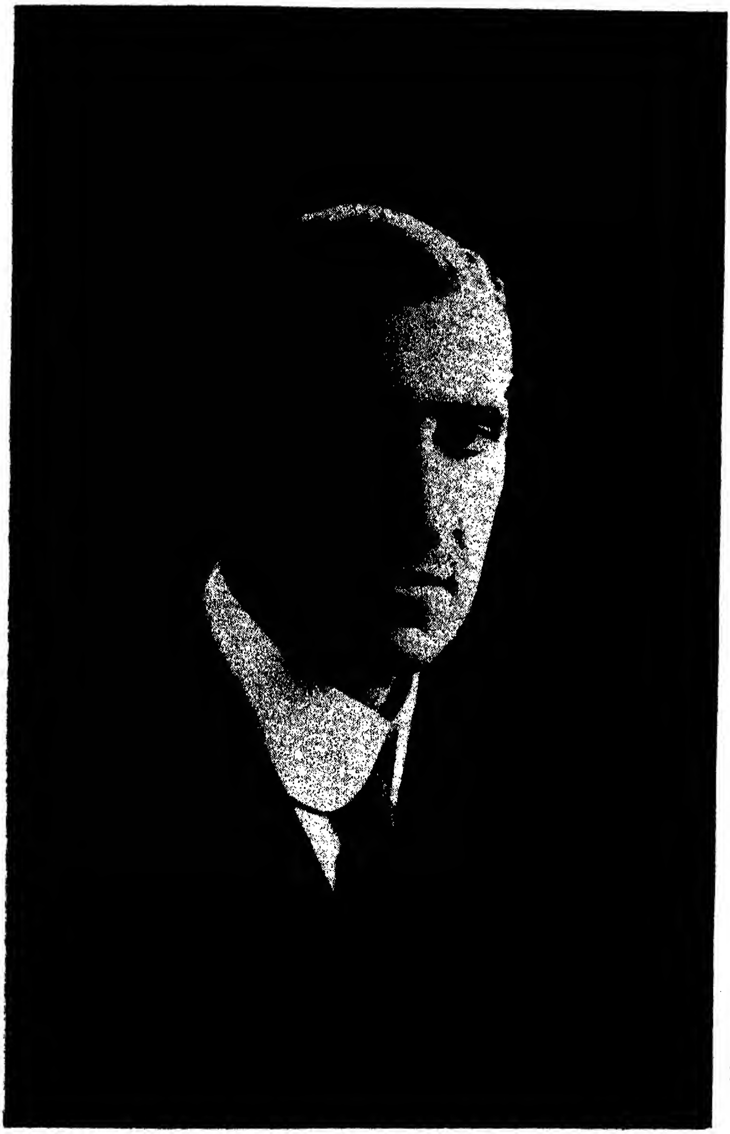


Plate 13.
Mr. J. D. STORY, I.S.O.

"As one who has been closely associated with him for twenty years, I feel that special mention should be made of Mr. Story's influence upon Public Service organisation and morale during his fifty-four years of distinguished and meritorious service.

"Mr. Story's organising and administrative capacity was quickly demonstrated. At the age of thirty-four years he was appointed Under Secretary of the Department of Public Instruction. During his term of office as permanent head of that Department there were marked developments in all phases of educational activity—kindergarten, primary, rural, vocational, technical, secondary, and University. It was during this period that a very high tribute was paid to Mr. Story by the late Sir William MacGregor, then Governor of Queensland and Chancellor of the University of Queensland. Sir William said that during his long experience as Governor and in allied positions he had met only three first-class administrators—one of these three was Mr. Story.

"In the Public Service with its wide ramifications and extensive community interests Mr. Story, as Public Service Commissioner, found ample scope for exercising his zeal and inculcating his ideals of service.

"Throughout his official career he has displayed outstanding ability, breadth of vision, resourcefulness, great courage, and boundless energy —yet unfailing courtesy and helpful encouragement. He has had wide and varied experience; he knows Queensland and Queensland's requirements.

"Mr. Story's work as Commissioner remains an inspiration; it leaves an indelible impress on the Service. His Majesty has honoured him in the award of the Imperial Service Order; the Government has honoured him in naming after him the 'Story Bridge' which represents strength, organisation, workmanship, and usefulness; the Service will honour him by striving to attain and maintain his high standard of public duty."

Mr. STORY'S CAREER.

Born in Jedburgh in that Scottish Borderland where every contour breathes British history, Mr. Story came with his parents to Brisbane in 1877 and while still young enough to get all his education in that city. He attended successively the Brisbane Normal School, the Brisbane Grammar School, and the Brisbane Technical College, and received further courses of training under private tuition. He thus acquired the basis of a wide culture for which he became distinguished in after years.

Mr. Story entered the Department of Public Instruction in 1885 and within 19 years attained to the position of Chief Clerk and Acting Under Secretary at the age of 34 years. He advanced to the full status of Under Secretary two years later, in 1906. In 1920 he was appointed Public Service Commissioner and remained in that office until his retirement.

Throughout the past 36 years, Mr. Story has been a dynamic influence in the development of Queensland and State instrumentalities, first in the field of education and later in the broader sphere of general administration. In educational progress in Queensland his name will always be associated with the establishment of the University of Queensland, State High Schools, Teachers' Training College, Technical, Vocational, and Rural Schools, and the Home Project Clubs for Primary Schools. The development of the scholarship system, the itinerant teaching service and afterwards the Primary Correspondence School, and the inauguration and extension of medical and dental services, including ophthalmic treatment for children in the Western Division of the State, are all the outcome of his remarkable vision.

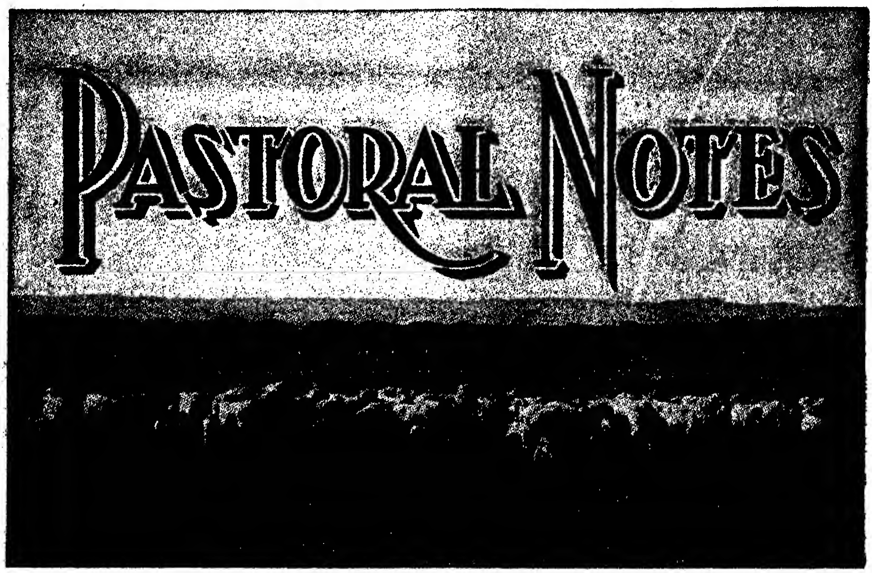
The primary industries of Queensland especially are indebted to Mr. Story for the constructive statesmanship he has brought to bear on the solution of many of their marketing problems. Always interested in the welfare of the people on the land, an interest first exemplified by the extension of educational facilities throughout the State, his was a leading influence in the establishment in 1922 of the Queensland Producers' Association. At the request of the Queensland Government he visited California for the purpose of obtaining first-hand information on agricultural education and methods of rural organisation in that progressive country. The results of his on-the-spot studies were published in a series of illuminating articles in this *Journal*, and formed the basis of the scheme of rural organisation afterwards inaugurated by the State Government and which has given to primary producers so large a measure of control over the marketing of their own commodities. He became the first chairman of the Queensland Council of Agriculture and remained a member of that body until it was firmly established under statutory authority. On his retirement under pressure of other public duties, the Council of Agriculture, on behalf of the organised primary producers of Queensland, specially thanked the Premier for having made Mr. Story's services available. He has since kept in close touch with the rural industries and has been the moving spirit in the formulation of comprehensive schemes for their technical progress and economic benefit. Notable examples of this practical interest were the appointment of commissions of inquiry into the sheep and wool industry, the beef cattle industry, and the establishment of the Brisbane Abattoir. Articles too numerous to mention on various aspects of education, primary production, and cognate subjects have flowed from his able and vigorous pen. Among his notable contributions to current thought—and which no doubt inspired subsequent action—on these matters were papers entitled: "Population Lag in Rural Areas"; "Town Lads for Land Jobs"; "Development of North Queensland"; "An Efficiency Campaign in Primary Production"; "Instructional Staff of the Department of Agriculture and Stock"; "Specialised Training for Special Positions"; "Co-ordination of Agricultural Activities"; "The Researcher and the Producer"; and "Training of Field Officers."

Of Mr. Story it may be said that he is "a man of cheerful yesterdays and confident to-morrows," with a desire to "spread the butter of enjoyment more evenly over the bread of necessity." He obviously believes that an investment in knowledge pays the most interest, and he has given, and continues to give, the best that is in him of undoubted genius and the highest constructive effort for the benefit of Queensland, with yet no film to his vision. A just man, he won and retained the confidence of successive Governments.

Mr. Story early recognised the need of a University as the coping stone of the Queensland educational system, and to which moneyless youth might enter on merit alone. As Vice Chancellor of the Queensland University, he is a front ranker in education and administration—a combination in which few men win a double-first. As an administrator, he abhors the dead-end and the "sapless dreariness of an awful cui bono," and believes in giving young people in the Public Service a chance of developing their natural capacity, instead of allowing them to wear deep the ruts of changeless routine. His concern for the future of the youth of Queensland is expressed in *The Apprenticeship Act*, in which he had a shaping hand. In a crowded and fruitful life, Mr. Story has had the happiness of seeing many of his projects become part of the cultural and industrial life of the State.

In his public utterances, Mr. Story has always claimed close attention, not only for soundness of matter but for vitality of thought, clarity and originality of expression, and extensiveness of vocabulary. Every speech, whether prepared or extempore, could be printed as spoken—the sort of speech that delights a sub-editor with glints of brilliant phrase, polished epigram, flashes of humour, and evidence of a broad, kindly and comprehending human tolerance.

Through the Bureau of Industry as collaborator with the Co-ordinator General (Mr. Kemp) in the duties devolving on him under "*The State Development and Public Works Organisation Act of* 1938," Mr. Story is continuing his association with the primary producers of Queensland, who appreciate the fact that his keen judgment and ripe experience are still available to the community.



Scrub Feeding of Sheep.

EDIBLE shrubs and trees which are useful as a supplementary ration for sheep cover a large area of Queensland. Methods of feeding vary according to the class of edible bushes available. Stockowners accustomed to scrub feeding make full use of the varieties available, and proportion the day's supply to vary the feeding to best advantage. Although some of the shrubs and trees are not relished under normal conditions, the intensity of a drought gradually reduces the sheep to starvation point, and it is then that whatever top feed is on the property should be made full use of. The system of making this available to the sheep varies according to the habit of growth, but there are few now who destroy the tree to feed the sheep. Lopping is the usual practice.

The digestibility of many of the edible varieties of vegetation leaves much to be desired, consequently they are very poor substitutes for grasses and herbage. When the stage is reached at which the sheep begin to lose condition, and before they fall away to any appreciable degree, scrub feeding should commence. At first the sheep are not inclined to eat much, and then only the most palatable portions. Very little need be provided at the start, and this should consist of a large proportion of the best available. As the sheep take to it, increase the supply, and gradually lessen the percentage of the most palatable until a well-based scrub ration is provided in keeping with the varieties available on the property. If sheep have to be scrub-fed for a lengthy period, they are likely to develop digestive disorders, but this is influenced by the nature of the shrubs or trees they feed on. Some varieties will carry them on for many months without showing any ill effects on their condition, but a good lick should be of considerable help in retaining their normal health and condition, no matter what class of vegetation they are fed on. The water to which they have access should be the first point for consideration before preparing a lick, for during very dry weather sheep will drink much more water than they do when juicy food is available.

If the water is slightly salty, say 30 grains to the gallon, it can be considered normal, but if over that amount the salt in a lick may be reduced until the total reaches 250 grains to the gallon, when no salt is needed. Salt alone is not the only ingredient required in a lick, as many other minerals, the chief of which are lime and phosphoric acid, are equally essential.

Analyses of most of our trees and shrubs show rather a low and an uneven mineral content, the lime being fairly well supplied, but they lack in phosphoric acid. Analyses also show rather high carbohydrate and usually a low available protein content. It may, therefore, be assumed that a lick should be based on the salt content

of the water available, and carry protein, phosphoric acid, and lime. A sterilised bone meal carries these three ingredients; it is recommended as the base of the lick, say 60 parts. Other ingredients are salt, 30 parts; Epsom or Glauber salts, 5 parts; and molasses, 5 parts. As the protein content of bonemeal is low, this ingredient can be added by using meals—such as cotton seed, peanut, wheat, linseed, or other such meal—all of which supply a most important want. Blood and meat meal, however, carry a greater protein content and may be used to advantage in supplying this element in a lick. Neither is attractive to sheep, however; therefore any mixture supplied should carry an ingredient to induce the sheep to take it. If salt is lacking in the water, it may be used to advantage in inducing sheep to take the desired amount of mixed lick. In the absence of salt, cotton seed or similar meals are attractive, and the intake of lick regulated to about ½-oz. per head per day through their use. The action of a good lick is to stimulate the digestive organs and so whet the appetite as to cause the sheep to eat more and, at the same time, make better use of the food consumed—a decided advantage when scrub feeding.

Practically all our Western timbered country carries a proportion of useful edible shrubs and trees, which include a wide range of varieties (too numerous to mention here) growing over large belts of country. Too much value cannot be placed on the useful fodder trees of the West and when scrub feeding becomes necessary every effort should be made to preserve them.

DODDER IN LUCERNE SEED.

Lucerne is grown from seed and is usually sown with the object of providing a stand for several years. With this in mind, only the best seed should be bought with an assurance that it is free from dodder.

Dodder is an annual parasitical plant found in the warmer parts of the world. Its seed germinates in the soil, sends up a stem which attaches itself to the host plant which, in Queensland, is mostly lucerne. It is leafless, with twining thread-like stems, which attach themselves to the host plant by means of tubercles; from then onwards the parasite draws its nourishment from this source and severs its connection with the soil. The immediate effect is that the host plant is called on to support not only itself but also the dodder until ultimately the exhausted plant dies, in most cases smothered in a tangled mass of light-brown threads. Dodder produces seed quickly, so that it can run the full life cycle (seed to seed) before the host plant dies from starvation. Dodder seeds are borne in a globular capsule with four seeds in each. These seeds are pressed together, giving them their characteristic flattened surface.

Unfortunately, this parasitical growth is common in lucerne fields. Experience shows that the dodder seeds cannot be removed satisfactorily from lucerne seed with cleaning machinery or by sieving; this statement is based on many unsuccessful attempts to make saleable dodder-infested lucerne seeds.

Growers of lucerne seed, in fairness to themselves as well as to those who may buy their seed, *should never harvest seed from a dodder-infested field.*

It should be borne in mind that any seed for sowing, or any material found to be dodder-infested, is subject to immediate seizure, and the person offering infested seed for sale is liable to prosecution. A £50 fine is provided for the sale of lucerne seed containing dodder. No excuse can be accepted for the presence in seed or feed of such a destructive parasite which can well be considered as lucerne's worst enemy.

Buyers should always insist on an assurance that the seed they are purchasing is dodder-free.

Samples of lucerne seed representing seeds purchased by farmers for their own sowing are examined free of charge, at the Seed Testing Station, Department of Agriculture and Stock, Brisbane. Samples should be of not less weight than 4 oz., and marked as follows:—

Sample of   seed drawn from   bags
representing a total of   bags marked
Purchased from   of   on
Name and address of sender, and date.

It is better to send a sample for examination as soon as it is purchased, rather than wait until the crop has grown, and then find it contains injurious weeds.

STRANGLES.

Strangles in horses is so called because one of the chief symptoms is a swelling of the glands of the throat, thereby causing strangling or interference with swallowing and breathing. It is an exceedingly contagious disease.

In addition to the swellings of the throat, there is usually a dirty discharge from the nose and sometimes the mouth, with occasionally a severe cough.

There is nearly always fever and loss of appetite, the latter due mostly to difficulty in swallowing.

The swellings develop into abscesses which contain pus, and these may or may not burst naturally and discharge their contents, in which case the patient usually improves.

The cause of the disease are small bacteria which are very easily spread from one animal to another by means of water and feeding troughs, bedding, harness, hands of attendants, &c., as well as by direct contact.

In attempting to treat the disease, particular attention must be paid to the isolation of all affected animals, and great care must be taken that none of the sources of infection mentioned is allowed to contribute to the contagion.

Inoculation of all the in-contact horses with a vaccine has definitely proved of value in preventing the disease.

Treatment of affected horses consists in painting the swellings with strong tincture of iodine once daily for three days in order to bring them to a head, and then opening them by surgical methods and keeping them well syringed out. Inhalations of medicated steam are used for relieving the congestion of the air passages.

Drugs such as potassium nitrate (saltpetre) and potassium chlorate may be added to the drinking water, and an electuary of green extract of belladonna is frequently given. In bad cases the use of the new sulphanilamide preparations has proved of great value.

It must not be lost sight of, also, that although strangles most commonly occurs in young horses (yearlings and two-year-olds) it may occur in any age from foals to aged horses, and typical cases are by no means rare where abscesses occur in all parts of the body, notably the chest and limbs, with or without an affection of the throat.

DRUG TREATMENT FOR REDWATER.

There are two kinds of redwater in Queensland. Both are caused by minute blood parasites and are carried by the tick. The differences between these two organisms are so small that they can only be recognised under the microscope. It is impossible to determine which type of redwater is present by an examination of an animal in the field. Fortunately, this is not necessary.

During the last few years intensive efforts have been made to find a suitable drug which would be effective in treatment and yet easy to apply. For many years piroblue held favour. This is effective in the treatment of one kind of redwater, but is ineffective against the other. Unfortunately, the common form in Queensland is unaffected by piroblue. Moreover, piroblue has a great disadvantage in that it requires to be used intravenously—i.e., it must be inoculated into the jugular vein.

Acaprin is now used largely in the treatment of redwater outbreaks, and is known to be effective against both forms of the disease. It is easily applied because the dose is small and it can be injected subcutaneously—under the skin. Supplies of the drug are kept on hand at the Department of Agriculture and Stock and by leading chemists. It is put up in the form of a solution and in single doses.

In areas where redwater is common, owners should keep a few doses of the drug on hand, together with a small hypodermic syringe.

Cases should, of course, be treated as early as possible, but even those which look hopeless at the start will, within an hour or two, show improvement, and so go on to recovery. A second injection can also be given without harming the animal in any way.

"PINK EYE" IN SHEEP.

"Pink-eye," or infectious ophthalmia, has been known for many years in Australia, and although the mortality is usually very slight, deaths may and do occur in drought or semi-drought areas where, because of blindness, sheep are unable to get to water.

A lot of trouble follows outbreaks in travelling mobs of sheep or during mustering for shearing and other purposes, for the disease is then very difficult to check.

Material from the infected eye of a sheep transferred to the healthy eye of another sheep reproduces the disease, and healthy sheep grazing on tall pasture (for instance, most seeding grasses, &c.) and running with infected sheep may also suffer. If, however, the grass is kept well cropped down, the liability to infection is considerably reduced. It is presumed, therefore, that in the field, "pink-eye" is not transmitted from sheep to sheep by direct contact, but by the material from the infected eyes being brushed off by grass or herbage, and thus conveyed to the eyes of healthy sheep. Flies also may spread the disease.

An attack of the disease appears to convey an immunity, but if only one eye of the sheep is affected, this is the only eye which possesses the immunity.

It is also known that exudate from the eye becomes non-infective after drying for a short period. Thus, in fine weather, healthy sheep can be turned into previously infected paddocks or driven over stock routes without risk twenty-four or forty-eight hours after infected sheep have been moved out of these places. There is also some evidence to show that any injury to the eyes through dust, grass seeds, or anything else increases the liability to infection.

The symptoms can be divided into three stages which ordinarily follow one another, although it is quite common for the trouble to clear up at the second stage and not proceed to the final stage of ulceration.

The first stage is characterised by a discharge from one or both eyes, and on examination the membrane surrounding the eye is found to be inflamed and the eyelids swollen. These symptoms are followed by the second stage, in which the front of the eyeball become smoky or opaque. A scum is gradually formed through which small branching blood vessels may be seen and a varying amount of pus is present in the corner of the eye.

By this time the sheep is quite blind in the affected eye, and shows signs of acute pain, while the least sound will disturb the animal, causing it to rush blindly in any direction with its head held high, progress being stopped only by violent contact with a fence or some such object.

The third stage, which is not seen in all affected sheep, is one of ulcer formation in the front of the eye. Sometimes the ulcers appear to burst, and the eye becomes practically covered in pus.

Many cases, however, do not go as far as this, and even if left untreated the animal may recover with little or no loss of slight, although complete recovery probably takes a month or even longer.

As in many other diseases of sheep, treatment depends on the facilities for handling the sick animals. All affected sheep should be at once isolated and cut up into small hospital mobs held in small shady paddocks, handy to water, where they can be supervised easily.

A few drops of a $2\frac{1}{2}$ per cent. solution of zinc sulphate in water, made by dissolving 1 oz. zinc sulphate in 1 quart of water, should be dropped into the affected eyes by means of a shearer's oilcan. All pus and other matter is wiped from the eyes with cotton wool soaked in this same solution.

This treatment should be carried out as frequently as possible, and usually the disease will clear up after about a week.

THE MERINO.

The Merino constitutes over 98 per cent. of the sheep population of Queensland. Under average seasonal conditions in the Central and Western Divisions of the State they adapt themselves to the varying circumstances and are not likely to be replaced by any other breed.

Merinos vary in type and also in the class of wool they produce, the small fine-boned type usually producing a fine short wool, and the large-framed robust type

producing a longer and stronger wool with a greater weight of fleece. Although the value per lb. of the different types of wool are influenced by the fluctuations of popular demand, the good length, bulky wools showing character have always maintained the highest average per fleece. Fluctuations in the Merino wools generally, however, have not been so marked as with other breeds and crosses. As the large-framed, plain-bodied type adapt themselves more successfully to most of Queensland conditions and uses, the breeder's aim to produce this type should be more pronounced.

Among Merino breeding flocks in Queensland, the wool generally has a tendency to fine down, therefore the necessity for strong wool showing character is apparent.

The large-framed Merino ewe also is most suitable for crossing with the British breeds, both as mothers for fat lambs and for producing half-bred ewes for which there is a growing demand in the fat lamb raising districts.

TRUCKING YARDS.

Some bruising of stock occurs in the trucking yards, and it is quite commonly held that this is unavoidable. Suitable design of yards and races and quieter working of stock are the answers to this fallacy.

In moving cattle from yard to yard or pen to pen, there is some congestion just before, during, and just after passing gate or race. It is obvious that at such places rails should be flush with the posts and padding used where the fences make sharp angles. It is equally obvious that working must be very steady to avoid jamming and, consequently, bruising—more particularly with the outside beasts. To prevent undue crushing at the approach, it is best to have the fences funnel—or V-shaped. If the wings are long and the gate wide the working is not slowed up and the number that can pass through is regulated well back, so that a jam does not occur at the actual place of passage. After passing through, there should be no obstructions to prevent fanning out. For this reason, a straight fence forming a side of two yards is not desirable when a corner gate is used.

When working cattle through one yard to another, gates should be opposite each other—i.e., in a direct line with the direction in which the beasts are streaming. The wings to a crush should both converge. It is bad practice to have one wing in a direct line with one side of the crush. This is often the case when an existing fence is used for one wing. As cattle work better uphill, the loading-out race or crush should be slightly inclined upwards to the truck.

CROSSBRED EWES FOR FAT LAMB RAISING.

In every State, especially in Queensland where flocks are 98 per cent. merino, the question of the right type of ewes for the industry is raised. It is presumed, then, that the fat lamb raiser has, in most cases, to breed his ewes for the purpose from the stock available.

Merino ewes are the necessary choice, and these should be the strongest, largest, most robust type procurable. The type of ewes generally culled for strength on a merino station is the most suitable ewe to start with. With these should be joined one of the longwools—such as Romney Marsh, Border Leicester, or Lincoln. The pure-bred Corriedale ewe also is very suitable. The ewe progeny resulting from the breeding indicated should form the breeding flock for the raising of fat lambs. On these longwool crossbreds should be used one of the Downs type of ram; either Southdown or Dorset Horn give best results in Queensland. The resultant drop, both ewe and wether lambs, should be sold as fats.

Many ewe lambs bred the right way for a breeding flock along the lines mentioned are slaughtered annually. The price for true suckers is too tempting, but, in the long run, breeders would be well advised to retain at least a proportion of their ewe lambs as the future breeders in their fat lamb business.

The right type of ewe lamb is worth more as a potential breeder than would be realised at fat lamb rates.

MEAT AND BLOOD MEALS.

Meat meals and blood meals sold under a variety of names are rich in digestible protein. A high-class meat meal with a crude protein content of 65 per cent. has about twice the digestible protein of commercial cottonseed or linseed meal. In farming terms, this means that 1 lb. of high-grade meat meal has about the same feeding value as 2 lb. of linseed or cottonseed meal.

The cost of meat or blood meal is not greatly different from that of the vegetable meals, and if they can be conveniently included in the ration of dairy cattle feeding costs will be reduced.

Only dairy cattle which have been consistently underfed take kindly to meat or blood meals. Cattle which have been accustomed to small quantities of these meals from birth also present no difficulty. As a general rule, however, dairy cattle only slowly acquire a liking for concentrates containing meat and blood meals and at first only a few ounces should be included in the regular ration. The amount can be gradually built up to the required level, which will, of course, depend upon the quality and quantity of other foods used. Advice on suitable rations may be obtained from the Department of Agriculture and Stock, but the dairy farmer can usually adjust the concentrates in the ration to conform with the milk yield of the individual cow.

Grain and molasses, grain and salt, milling by-products—such as bran and pollard or such attractive meals as linseed, cottonseed, or cocoanut—may be mixed with the meat and blood meals to attract unwilling cows.

Animals which still refuse to eat these meals may be kept for a short time without any food, other than that offered, if allowed plenty of water. It is important that the feed should be changed night and morning, so that a fresh mixture is always before the cow. If this system appears too drastic the nose-bag method may be used. Freshly-chaffed green maize and the meal are mixed before using, and the contents of the bag should be changed night and morning. Most cattle can be induced to eat meat or blood meals by one or other of these methods.

Both meat and blood meals should be fresh, free from objectionable odour, finely milled, and sterile. An undue greasiness is not detrimental, but, in general, the higher the fat content the less palatable the meal.

Meat meals should show a good analysis. Any preparation with a crude protein content of less than 50 per cent. is not a true meat meal, but a meat and bone meal. Blood meal should show a minimum of 75 per cent. crude protein. It should be almost without smell.

As both meals decompose when allowed to remain in a moist condition they should be stored in a dry place and any excess in the feed boxes should be removed each day. Material which has been "fouled" by moisture soon becomes a source of danger and is then only fit for fertilizing.

SHEEP LICKS.

The necessity for the use of a lick for sheep is generally indicated by a loss in condition more pronounced than what may be expected because of depleted pastures only.

The right use of a lick should be based on the proved deficiencies in minerals in water and proteins and minerals in the grasses to which sheep have access, and which are arrived at by analyses of the grasses and waters, respectively.

The most important deficiency in a wide extent of Queensland's grazing country is phosphoric acid. An ingredient making this loss may, therefore, be safely used as the base of most licks prescribed for sheep. Sterilized bone finely ground is recommended. This substance is rich in phosphoric acid, and, in addition, contains some small quantities of fats and protein, also lime. A tonic may be a help, and sulphate of iron is useful for this purpose. A laxative is a necessity under conditions of hard feeding, and Epsom salts is as effective and as cheap as anything else offering. Salt in some cases also is a necessity, and the quantity prescribed should be strictly governed by the salinity or otherwise of the water accessible to the flock.

Under drought conditions a substantial benefit has followed the addition of a protein to the lick. This usually consists of one of the better meals, and the choice of a particular one should be influenced by the price at the moment. Advice on the use of stock licks may be had on application to the Department of Agriculture and Stock.

Calf Feeding.

ABOUT 87 per cent. of cows' milk is water. Of the remainder, nearly one-third is fat, and a good separator, if properly operated, will remove about 95 per cent. of this fat. Very little protein is removed. It follows that, if the separated milk is to be made equal in feeding value to the original milk, either the fat or its equivalent must be replaced. There is no need to replace protein, and for this reason it is not good practice to feed such protein-rich materials as linseed meal in conjunction with skim milk to very young calves.

Dripping obtained from a reputable meatworks, or cod liver oil, may be incorporated in the milk, but they are rather expensive and difficult to mix properly. A better system is to use finely ground maize. Maize meal from good-quality grain contains as much as 5 per cent. high-grade oil and 70 per cent. of easily digested carbohydrate, which, to some extent, serves the same purpose as fat.

The new-born calf should get whole milk for a fortnight if it is to be given a good start in life. For the first few days it may be fed three times daily; after that, twice daily is enough. A safe level to feed is 1 gallon to each 100 lb. live-weight. At the end of the second week a little maize meal is stirred into the milk and the change to separated milk begun. By the end of the third week the maize meal may be built up to a handful, and the change to separated milk completed. By the end of a month the calf begins to nibble grass, and can consume about ½ lb. of meal.

From then on to the eighth week the milk can be replaced progressively by water and a meal mixture. By the eighth week the calf will be able to eat up to 2 lb. daily of a suitable meal mixture.

Such a mixture may contain 35 lb. of linseed meal and 65 lb. of a cereal meal Pollard and bran should not constitute more than one-half of the cereal meal. The remainder may be crushed oats, barley, or maize. About ½ lb. of salt and 2 lb. of sterilized bone meal should be included in the mixture.

As the animals take more grass or hay, the supply of the meal mixture is restricted. At six months, unless an adverse period is encountered, the calf should be able to fend for itself.

GROOMING THE MILKING COW.

Grooming of dairy cattle is a refinement in farm management which calls for comment. High-producing animals are usually kept on high-priced farms, where natural scratching or rubbing-posts—trees or stumps—have been removed. Frequent milking and stall feeding prevent during much of the day the natural function of self-licking. Both these small inhibitions have a marked effect on milk production and it has been observed that, under these conditions, some grooming is decidedly beneficial.

FLUSHING THE SEPARATOR.

The test or percentage of fat required in cream should be not less than 38 per cent. during the hot summer months and not less than 34 per cent. during the cooler months of the year. Whatever make of separator is used, during the process of separating satisfactory results can only be obtained when the cream screw is adjusted so that the driven speed of the separator conforms with the corresponding number of revolutions per minute recommended by the maker of the machine.

At the completion of separating, flushing with cold or warm water so as to remove the last of the cream from the patties is an undesirable practice. If the cream bucket is not removed during the process some of the impurities and slime adhering to the bowl may be removed and deposited in the cream. This applies particularly if warm water is used. When separated milk is used for flushing, excessive milk solids are introduced into the cream, and these will have a detrimental effect on quality, as well as lowering the fat test. Thus the proceeds of flushing should be fed to the pigs or calves on the farm. The maintenance of cream quality is too important to be impaired by laxity in this respect.

BRUSHES FOR CREAM CANS.

Although the necessity for using only brushes for the cleaning of dairy utensils is generally well understood by dairy farmers, instances of persistence in the use of cloths for this purpose still come under the notice of field officers. Cans washed with cloths which are not kept scrupulously clean, or renewed for each occasion of use, are a potent cause of taints, such as "dish cloth" or "cheesy" flavours, in milk and cream, the flavour becoming noticeable after the cream has been kept for some time, and particularly if it is not delivered to the factory daily.

The use of cloths to wipe cans or utensils dry after washing and scalding or steam-sterilizing is also unnecessary; in fact, it only helps to reintroduce bacteria to the cans. If properly scalded or steam-sterilized the heat of the can will cause the immediate evaporation of any remaining moisture.

PASTURES AND BUTTER-FAT.

Efficient production is the only form of economic production, and this, perhaps, applies more to dairying than to any other primary industry.

Efficiency is achieved by ensuring that cows receive the right food in the right quantities. The cheapest means of filling the first requirement is by herd testing and culling, since by this method only high-producing cows are maintained on the farm.

Nowadays, the value of dairy land is judged, not by the number of cows it will carry, but by the butter-fat production per acre. Once this idea is fixed in mind, it becomes obvious that the higher the cow yields the more economic a producing unit she becomes. Low producers mean reduced output and reduced efficiency in the working of the farm.

As the dairy cow is required to produce large quantities of milk which is rich in protein, it follows that it must be given foods which are likewise rich in protein. There is little difference between the food values of the various popular cultivated grasses, which in the early stages of growth are equal in protein content to many valued concentrates. The young shoots are very rich in this respect, and this accounts for rapid recovery of cattle grazing on pastures after rain following spells of dry weather, or after a burn.

Here, then, is a natural food for the dairy cow readily available. It is economic, too, because with a little care it can be produced in large quantities, and it requires no labour in feeding. The dairy pastures then deserve special attention to maintain them at an efficient standard. There are several ways of maintaining and improving pastures, namely:—

(1) The growing of grasses which have a high feeding value.
(2) Top dressing pasture land.
(3) Rotational grazing, or, in other words, feeding the grass while in its young stage of growth.
(4) Renovation of pastures.

CARELESS BRANDING.

Slovenly methods in the branding of stock, particularly cattle, are observed far too frequently, the results being most undesirable in many respects. Quite often the carelessness with which the branding irons are applied involves cruelty, although it may be unintentional.

It is cruel to hold the hot iron on an animal until the skin is burnt through, and it cannot be justified on the score of necessity. This practice may be due to underheated irons, but, on the other hand, it may be due to over-hot irons held on the skin a fraction of a second too long, or with too much pressure. Such branding causes blotches, and very often the actual letters or figures are undecipherable. The skin in the area involved is ruined for tanning purposes, and festering sores may result. Identification of the animal by means of such a brand is rendered very difficult, if not impossible.

It is a well-known fact that, on large stations, where thousands of calves are branded yearly, and where speed is a factor in the handling of large mobs, the standard of branding is much higher than on some small holdings—such as farms, where only two or three calves may be branded at irregular periods.

SORGHUM POISONING ANTIDOTE.

Molasses diluted sufficiently to allow of drenching is regarded as an antidote for sorghum poisoning, a quart being advisable for .. cow.

The best antidote, however, is a mixture of solutions of carbonate of soda (washing soda) and sulphate of iron. The procedure is to dissolve 1 oz. of washing soda in 1 pint of water, and, in a separate pint of water, half an ounce of sulphate of iron. These ingredients should not be mixed until immediately before application as a drench. Two pints of the mixture are sufficient for a cow, and half a pint for a sheep. If drenching cannot be done, the mixture may be poured into the stomach through a canula inserted as for a bloat, a hand's breadth forward of the point of the hip bone on the left or near side.

The solutions of each ingredient may be concentrated, but they must be kept separate in glass, coloured preferably, wood or earthenware containers—not iron—and made up with the addition of water to contain 1 oz. of washing soda and ½ oz. of sulphate of iron to the 2 pints of the mixture.

Larger doses of carbonate of soda and sulphate of iron could be given, but it is questionable whether an increased dose would be of any advantage.

Sulphate of iron may be bought for about 3d. per lb., and washing soda for slightly less. A few pounds of each kept on hand for emergencies might obviate a serious loss.

SKIN DISEASE.

A condition—dermatitis—manifested by intense irritation, and development of dropsical swellings, and later death of unpigmented surfaces of an animal's body, sometimes occurs during summer in country where trefoil and St. John's wort grow. It is only on white unpigmented patches of the animal's skin that the condition appears. Pigmented or coloured portions of the skin remain unaffected. Feeding experiments have proved that the ingestion of these plants, together with exposure to strong sunlight, bring about the condition. Cattle so affected show signs of much irritation, biting, and licking themselves. Within a few days excoriation of the skin of unpigmented areas occurs. Animals become feverish and lose condition rapidly.

Sheep are affected similarly; the ears and face become thickened and dropsical, and the lips become hard and leathery. If shade is provided, animals seek it readily to obtain relief.

Staining of white patches on cattle with ordinary washing blue is protective. An application of a solution of permanganate of potash made with rainwater to a deep pink colour gives relief.

Feeding Fowls.

POULTRY-RAISERS as a whole have a very fair idea of the principles and practice of feeding, and take into consideration factors which make for efficient and economic production.

The present-day values of cereals may induce some to depart from old and accepted practices in order to reduce costs. There are three points, however, that must not be lost sight of if the best results are to be obtained and the general health of the stock maintained—viz., the vitamin content of the ration, the protein content, and the quantity supplied.

Vitamins.—Vitamin A is of outstanding importance at the present juncture, for the shortage in the ration may cause outbreaks of nutritional roup as well as lowered egg production. The feeding of yellow maize and green feed ensures a sufficient supply of this vitamin.

On most poultry farms during the winter months green feed is not plentiful; consequently, under normal circumstances the loss due to a shortage of maize cannot be overcome. It is therefore of paramount importance that the poultry-raiser should make a special effort to supply the birds with good succulent green feed. Green feed is the cheapest form in which the birds' requirement of this vitamin can be supplied. In cases where home-grown feed cannot be obtained, poultry-raisers should use at least 10 per cent. of good green lucerne chaff or meal in the mash fed to their birds.

Protein.—To obtain the maximum economic production, laying birds should have in their ration (i.e., grain and mash) a total of approximately 15 per cent. of crude protein. Maize has about 10 per cent. and wheat about 13 per cent. of protein. Where maize has been used extensively and is replaced with wheat it may be desirable to reduce slightly the protein content of the ration. This is most easily brought about by a slight reduction in the meat meal fed.

Generally speaking, however, the protein-rich meat meal is not overfed, and its greater use is advisable in certain circumstances. This is particularly so in the case of the poultry-raiser who feeds extensive quantities of skim milk to his birds. With the approach of winter the milk supply will probably diminish. In such cases the loss of protein of animal origin in the form of milk should be supplemented with meat meal.

Quantity.—Providing the right kind of food is being used, economic production is only possible by feeding the birds all they will consume. Do not be afraid of making your birds unduly fat. The good producer will convert the food supplied in excess of body requirements into eggs. Birds which cannot do this should be culled and sold for table purposes.

WORMS IN FOWLS.

Many young birds will soon be commencing their first season of production. During the rearing of these birds diseases such as coccidiosis, pullorum disease, and roup will have taken their toll. These diseases are spectacular in their onset and the symptoms manifested and the mortalities experienced have compelled the poultry farmer to undertake control measures in order to minimise his losses as much as possible.

~~In many instances, however, worm infestation has been overlooked.~~ The effects of worm infestation are usually insidious in nature, and being accumulative do not attract attention until the birds are seriously affected. Such effects include failure to make normal growth and even loss of weight, loss of appetite and activity, dull, ruffled plumage, and a paleness of the comb and shanks. The mortality, especially among young birds, may be serious. More important still, young pullets, while maintaining a ravenous appetite and being apparently in fair health, may not be producing their normal quota of eggs.

Of the various worms which infest poultry one of the most important is the large roundworm, which grows up to 4 or 5 in. in length, and is found in the intestine. Where the farmer pays careful attention to sanitation and cleanliness, this and other worms rarely become dangerous. By the regular removal of droppings and the adoption of other measures which promote cleanliness, the source of infestation is removed. Prevention of infestation is most important in the control of parasitic worms. There are, however, certain drugs which may be employed to remove the worms from the birds, and if treatment is employed regularly the infestation should be of no great importance. Treatment of poultry for worms may be undertaken either by mixing certain drugs with the mash (flock treatment), or else by giving the drug to each individual bird (individual treatment).

Flock Treatment.—Flock treatment can be applied with success only when the birds are kept under intensive or semi-intensive conditions. The procedure is to mix nicotine sulphate with the mash at the rate of .5 cubic centimetre of nicotine sulphate for every 1 lb. of dry mash. The amount of nicotine sulphate required is incorporated with just sufficient water so that when mixed the mash is flaky. About 1 part of nicotine sulphate to 400 parts of water is usually adequate. The mixing should be thorough so that no lumps remain. This treated mash is mixed fresh daily and fed continuously for four days.

Individual Treatment.—The best drug to use for individual treatment is carbon tetrachloride. This may be given in capsules or by means of a syringe and rubber tubing. The birds are starved overnight and treated next morning. They may be fed immediately after treatment. The doses range from ·5 cubic centimetre to 2 cubic centimetres, depending on the size of the bird. If the syringe is used great care must be taken to avoid delivering the drug into the windpipe, which would cause instant death. Before undertaking this treatment, farmers should apply to the Animal Health Station, Yeerongpilly, for further details.

PURPLE STAINED CHICKENS ARE ALWAYS COCKERELS—A WARNING TO BUYERS OF DAY-OLD CHICKS.

Now that determination of the sex of day-old chickens has become an accepted practice, it has brought with it the usual malpractices that seem to follow an innovation of this kind. The Department of Agriculture and Stock aims to prevent imposition by making it incumbent on any person licensed to determine the sex of day-old chickens to spray the cockerels with an indelible purple stain. The stain is clearly visible on the down of white chickens, and may be detected on coloured chickens by a little closer inspection of the beak and legs and the lighter parts of the body.

It has come to the notice of the Department that, as it is possible to buy up day-old cockerel chickens in large numbers, some unscrupulous dealers have apparently discovered that they might make a lot of money by selling cheaply bought cockerels as pullets, and by informing prospective buyers that the staining indicates some special pedigreed strain. The public is, therefore, warned that the staining is merely an indication that the chickens have been determined as cockerels by a licensed sexer.

EFFECT OF CLIMATIC CONDITIONS ON DIFFERENT CLASSES OF POULTRY.

Two classes of birds are generally used by commercial farmers—light breeds, such as Leghorns, Anconas, and Minorcas; and heavy or dual-purpose breeds, such as Australorps, Wyandottes, and Rhode Island Reds.

Light breeds, as a rule, are of a "highly strung" nature, and very susceptible to climatic changes, particularly during the early periods of production. Rains and cold snaps will invariably check production with this type of bird. This is particularly noticeable if the birds are not housed under the intensive system. If false moults are to be avoided, the highly strung nature of the birds also makes it inadvisable to alter their location until they have settled well into production and until spring approaches.

If, for any reason, light breeds have to be handled before the middle of, say, July, go about the work quietly and, if at all possible, work only in the afternoon, for most of the birds to lay on that day will have done so by then.

The dual-purpose breeds, on the other hand, are more docile and quiet. They are not so easily disturbed by climatic changes during the early laying stages, but are more susceptible to heat, as many dual-purpose birds lay on fat. In selecting breeders, select against this characteristic and choose the most active, alert birds. Greater liberties can be taken with dual-purpose breeds in relation to change of quarters, but do not worry them or shift them during early winter, as they are not immune from false moults.

TO SAVE FOWL FEED.

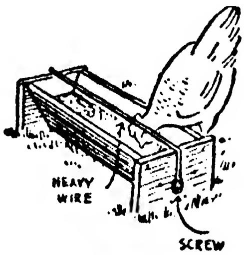


Plate 14.

One of the simplest and most reliable feed troughs for keeping hens from soiling the feed is this one. It is an ordinary feed trough, except that there is a strong wire fastened across the top, running from end to end. This simple device prevents the hens from getting their feet into the trough and wasting or contaminating the feed.

A WHITEWASH HINT.

A pound of cheap soap dissolved in a gallon of boiling water and added to 5 gallons of thick whitewash gives it a gloss-like paint and makes it stick better.

A WORD FOR THE BLACKBIRD.

Californian farmers say that the blackbird is most useful on a sheep farm. The birds perch on the sheep and pick ticks and other parasites out of the wool. Both the sheep and the sheepman appreciate the service, and so do the blackbirds, so everybody's happy.

There's the inevitable moral—farmers, protect your feathered friends!

Agricultural Notes

Cutworms in Seedling Cotton.

DURING the spring and early summer months one of the most serious pests of seedling cotton with which the farmer has to contend is the common cutworm.

In years of cutworm outbreaks the loss of stand may necessitate replanting. Replanting is successful only when the soil contains adequate soil moisture, and some time may elapse between a cutworm outbreak and the resowing. Late replant crops are rarely so successful as those sown early, and for that reason precautions should be taken against cutworms to ensure a commercial stand of cotton with the first seeding. Farmers, therefore, should be familiar with the pests and ready to deal with it if necessary.

The cutworm—the larva of a dark-brown moth—is a stout soft-bodied greyish-brown to greyish-green caterpillar growing up to 1½ inches in length which feeds principally on low-growing weeds. When these food supplies are disturbed in any way, the caterpillars may migrate to nearby cotton fields or, if already in the paddock, they may damage the germinated cotton. The pest feeds at night and normally attacks the stem just above the ground level.

Cutworm losses in cotton may be considerably reduced by a good cultural system. Thorough ploughing, in which weeds are destroyed completely, is necessary. Patches of weeds missed during ploughing are frequently the centre from which extensive cutworm damage may radiate. Ploughed land should be kept free of weeds for at least a month before the planting, which, if the rains are suitable, will be carried out between mid-September and mid-October. Early ploughing is, therefore, required. After planting, weeds should be kept in check.

If weeds are ploughed under immediately prior to planting the risk of cutworm injury is increased greatly, for many of the eggs and larvae on the weeds will survive and attack the cotton seedlings.

Virgin land, or Rhodes grass paddocks which are being prepared for cotton, usually contain little weed growth, and this, to a great extent, minimises the risk of cutworm injury.

Where direct control of cutworms is required, insecticides must be used. The poisoned bran bait method has been tested thoroughly and is recommended as a reliable control measure.

To prevent the entry of invading swarms, the use of one or more baited furrows is necessary. When the pest is within the field, the bait may be broadcast or applied in lines along the rows of cotton seedlings. If broadcast, about 50 lb. dry weight of bran will be required per acre; if distributed along the rows, 25-30 lb. dry weight of bran per acre should be sufficient for baiting purposes. The formula of the poison bran bait is as follows:—25 lb. bran, 2 lb. lead arsenate, 4 lb. molasses, and enough water (approximately 2 gallons) to make a friable crumbly mash which can be broadcast without difficulty. The bran and the lead arsenate are thoroughly mixed dry. The molasses is then dissolved in 1 pint of boiling water, and made up to 2 gallons with cold water. The solution is poured on to the already mixed bran and lead arsenate and stirred thoroughly into a uniformly moist but loose mash.

As the cutworms are night feeders, the bait should be applied in the late afternoon and evening.

STORING SEED GRAIN.

Maize, wheat, and other grains are best stored in insect-proof bins or tanks, which can be made gastight without any difficulty. Any weevils or other insects in the grain can then be destroyed by fumigation with carbon-bisulphide while the construction of the bin or tank will effectively prevent further attacks. Properly carried out, fumigation with carbon-bisulphide does not affect the grain, and it can be used for either stock feeding or seed purposes.

Frequently, however, the farmer has a few bags of seed wheat or maize and no bin or tank in which to store it. Under these circumstances, he cannot do better than use a mixture of paradichlorobenzene and naphthalene to keep the seed free from pests. Both these substances are white crystalline solids, each with its own characteristic odour. Both vaporise on exposure—paradichlorobenzene the more quickly of the two. The mixture is both toxic and repellent to insects; it kills insects already present in the seed and ensures a very considerable measure of protection against further infestation for a period of some months.

To use these fumigants for the special purpose of seed grain storage, equal parts by weight of paradichlorobenzene and naphthalene are first thoroughly mixed. The mixture can then be incorporated with the grain at the rate of 1½ lb. to every bushel of seed. Alternatively the mixture may be enclosed in cloth bags, each containing ½ lb., provided the same concentration of the fumigant is retained. The bags containing the fumigant would, of course, be evenly distributed through the bags of grain.

Of these two methods of using a paradichlorobenzene-naphthalene mixture the second is preferable, for any crystals remaining when the seed is sown can be retained for future use provided they are stored in an air-tight tin. These residual crystals will be almost entirely pure naphthalene and should be treated as such when making up fresh lots of the mixture.

Grain treated with paradichlorobenzene and naphthalene, though quite suitable for seed purposes, carries a characteristic taint and should not be fed to stock.

WINDBREAKS.

For the comfort of stock, windbreaks are a necessity, especially on open plain or high tableland country. In timbered country, provision should be made for windbreaks when the land is being cleared by leaving suitable stands of the original forest or scrub covering, otherwise the expense of establishing shelter belts will have to be incurred later on.

In country which has already been cleared, the planting of suitable trees on the prevailing windward boundaries of farms on tablelands, plains, and undulating country is worth serious consideration. If edible trees are planted, they might be useful in times of drought. A farmer would naturally hesitate before destroying shelter trees for feeding purposes, but, if the necessity arises, edible trees may be lopped without destroying them.

The undermentioned trees are mainly suitable for planting on the Darling Downs. Edible types are the kurrajong, bottle tree, Portuguese elm, honey locust, and carob bean. Less palatable trees are the cypress (*Cupressus torulosa*), *Pinus radiata*—commonly known as *Pinus insignis*—white cedar, and *Bauhinia hookeri*. The well-known and valuable western tree, the wilga, should be added to this list if available. Although there is a considerable variation in the palatability of individual trees, the wilga is both a useful and ornamental species.

In most cases the trees mentioned can be bought from nurserymen. In the event of expense proving an obstacle to adequate planting, the trees can be raised from seed in an improvised nursery on the farm. The seeds could be germinated in shallow boxes or tins about twelve months before the young trees are required for planting. In frost-free areas June, July, and August are suitable months for planting out the young trees in their permanent locations. Some protection should, however, be given to the plants in frost-susceptible districts if midwinter planting-out is attempted.

Protecting the young trees from stock is most important. If the trees are planted near a boundary fence, it might be found most convenient to erect a second inner fence to keep stock away from the trees until they are high enough to be out of reach. Smaller farm stock, such as sheep, can be let into the enclosure once the trees have attained sufficient height for their foliage to be above reach.

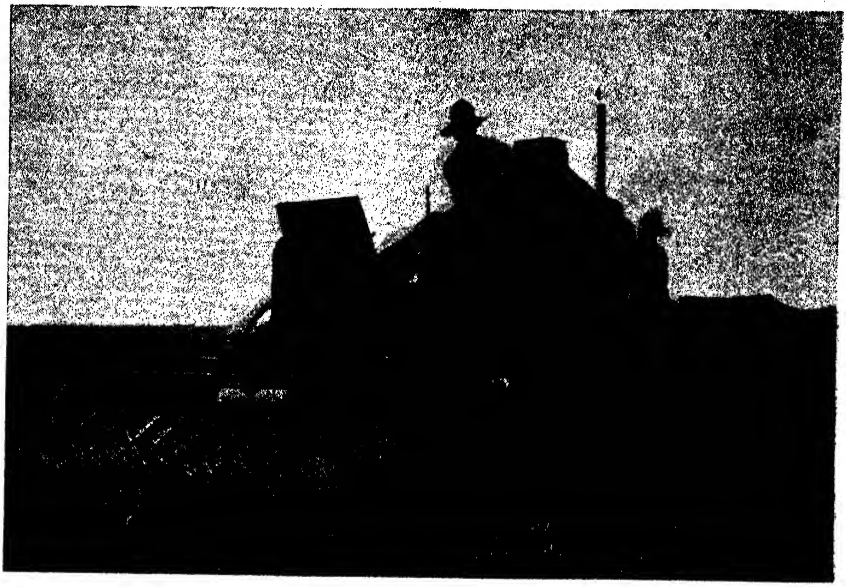
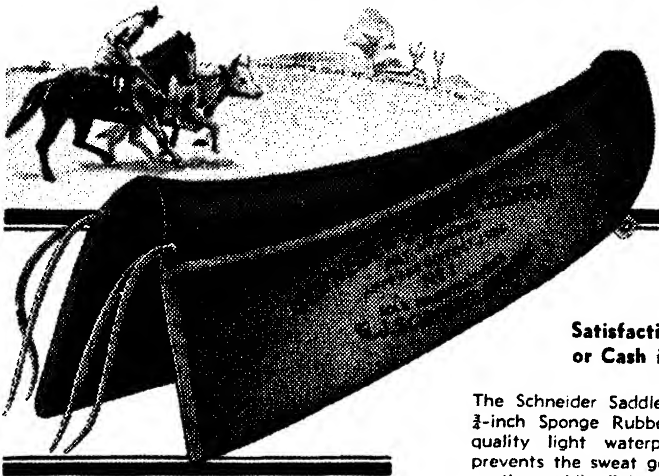


Plate 15.
AN AUTO-HEADER HEAD-ON IN A DARLING DOWNS WHEAT CROP.

Plate 16.
AUTO-HEADER AT WORK ON A BADLY-LODGED GRAIN CROP.

Save Your Saddle and Your Horse's Back



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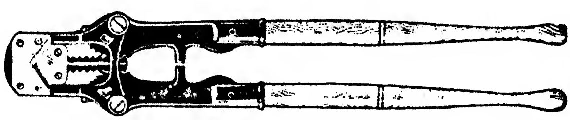

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LUCERNE ON THE DOWNS AND MARANOA.

Although comparatively few settlers in the Western Darling Downs and Maranoa districts have established lucerne stands, it is significant that most of those who have done so plan a considerable increase in acreage. The qualities of lucerne as a grazing proposition, both for sheep and cattle, are gaining wider appreciation outside the recognised agricultural regions. The results obtained on scrub and forest lands during dry spells at Guluguba, Columboola, Wallumbilla, and other localities are very encouraging. An adaptation of lucerne to a wide range of soils and a capacity for giving good results under adverse climatic conditions were clearly demonstrated.

In sowing lucerne, high seeding rates are unnecessary and have been the cause of many failures in the past; 3 to 4 lb. per acre is quite heavy enough for the districts named.

With the wide variation in farming conditions and soil types that obtain in these districts, hard-and-fast rules regarding sowing are not practicable. The following points are, however, important:—Deeper sowing than ¾ inch is inadvisable in all soils, except those of a self-mulching nature where, if necessary, the depth may be a little greater, provided that there is sufficient moisture to give the plant a good start in addition to germinating the seed.

Where old wheat land is to be converted into pasture, it is usual to sow the lucerne with the last crop of wheat. This method reduces costs to some extent; but, in soil that has a tendency to pack or cake after rain, it is advisable to drill the wheat in first and then follow with the lucerne—having the drill hoes out of the ground, and covering with light harrows. This avoids planting the lucerne at the same depth as the wheat—i.e., 2-2½ inches.

When broadcasting, it is difficult to get an even sowing with the small seed; but, if two sowings are made, one across the paddock and the other in the opposite direction, a more even crop can be obtained. Only light harrows should be used to cover the seed.

On small holdings where more intensive culture is practised, a method of sowing which might commend itself to dairymen, particularly in the Maranoa district, is to plant lucerne in rows 18 inches to 2 feet apart. Inter-row cultivation may then be practised when necessary after rain. Established in this way, the plant has exceptional drought resistance and an area of green feed for emergency use is assured.

All settlers in the reclaimed prickly-pear country might well turn their attention to lucerne as a grazing crop. With light seedlings it is not expensive to establish and is well worth a trial.

SWAMP LANDS.

Throughout a considerable stretch of the coastal country swampy areas of lesser or greater extent are encountered, particularly in the wetter regions where dairying is now expanding. These lands, to a large extent lying idle, could at no great cost be brought into use by planting them with para grass. This grass is easy to establish, because of its habit of rooting freely at the nodes. It is a rather coarse, vigorous grower, but has succulent stems and leaves and gives a large quantity of green material per acre. Under favourable conditions, yields of over 30 tons per acre have been obtained in one year. It is easily cut back by frost, and is, therefore, most suitable for the warmer localities.

This grass grows well in swampy places, the runners going out even into deep water. Once established, it holds its own with any other grass. It has a further advantage in that it is credited with completely drying out marsh lands.

Para grass is usually propagated by runners, which root readily. These runners can be easily planted in furrows about 3 feet apart and about the same distance between the rows.

SEED MAIZE SELECTION.

As like tends to beget like, the necessity of selecting seed from ears of desired type and known parentage is obvious. Some farmers, however, do not realise the importance of this, and are satisfied to sow seed of any breeding, provided the grain is sound and germinates readily. Uniform tasselling and maturity cannot be expected from such seed. When times of tasselling do not coincide, there is poor fertilization of late-maturing plants and reduced yields follow.

The general improvement of a crop and the rapid elimination of undesirable characters can only be brought about by a regular process of seed selection. Isolation of the growing crop is necessary to ensure that cross-fertilization with maize in neighbouring fields does not occur. That is all the more important because wind and insects frequently carry pollen over long distances. Where isolation is not possible, sowings may be arranged so that tasselling times do not coincide.

It has been proved beyond doubt that locally grown seed is more suitable for planting than comparable supplies of the same variety secured from outside sources. Farmers should, therefore, endeavour to improve their own seed by rigorous selection from year to year—provided, of course, the variety grown is continuing to give satisfaction—rather than buy seed annually, which cannot always be guaranteed as to its type and purity.

Seed selection may be carried out by the grower both on the field and in the barn.

Field selection is the better way, and it can be done conveniently when the corn is being pulled. More essential characters can be taken into consideration during field selection than are possible in the barn, where characters in the cob are alone considered. In the most rigid field selection the characteristics of only one parent can be determined, but, even so, seed selected from plants showing the following characteristics should give the best possible crop in the coming season:—

(1) The crop should have matured naturally, be thoroughly dry, and free from disease.

(2) Ears, when compared with the stalk, should be comparatively large and selected from those plants remaining upright.

(3) One good single ear to a plant is better than two mediocre ones, but where possible select from a plant with two good ears.

(4) Position of the ear on the stalk is important, for if too high from the ground harvesting is difficult and the risk of lodging is greater. If too low there is a danger of loss through weed overgrowth and also slow drying-out in showery weather.

(5) Most varieties sucker to a greater or lesser extent, but the smaller the sucker development the better the plant.

(6) The ears should be firmly attached to the stalk and droop when ripe. The point of the cob should be well covered by the husk as a protection against insects and the weather.

(7) The cob itself should be of moderate size, both in length and thickness, cylindrical (not tapered) in shape, having a well-filled butt and tip, yielding when threshed a high percentage of grain. Such cobs are much heavier than the average.

(8) The grain itself should be typical of the variety, uniform in depth and shape, and tight on the cob in regular straight rows.

Of all the characteristics in the grain, the farmer can least afford to overlook mixed colour, for maize showing this defect sells at a disadvantage if the crop is sold in the open market.

WHAT WE OWE TO POSTERITY.

There is debt to posterity which is owed by every owner of agricultural land. On him rests the responsibility of leaving to his successors his land in as good condition as it was when he turned his first furrow—even in a better condition, if possible. Anyone who does not do everything in his power to prevent his soil from washing away or from loss of fertility can hardly expect to be held in happy remembrance by those who have the misfortune to follow on in the cultivation of a misused and worn-out farm.

PROTECTION OF FARM FENCES.

Each year timber requirements on the farm cause a big drain on local timber resources. In some districts the position is now such that repairs and replacements are very expensive, and wastage on the farm should, therefore, be kept to a minimum. This can be achieved by preservative treatments which lessen the risk of damage by termites (white ants) and other destructive agents which shorten the life of fence posts and other types of timber which are normally in contact with the ground.

Fence posts must necessarily be durable and should preferably be free from sapwood. Several materials can be used in preservation treatments, but K55 creosote is the most suitable for the farm. K55 creosote is manufactured to specifications of the Standards Association of Australia and contains less tar than the heavy-grade creosote common on the market a few years ago. It penetrates well into the wood—a feature that is very important in the treatment of fence posts.

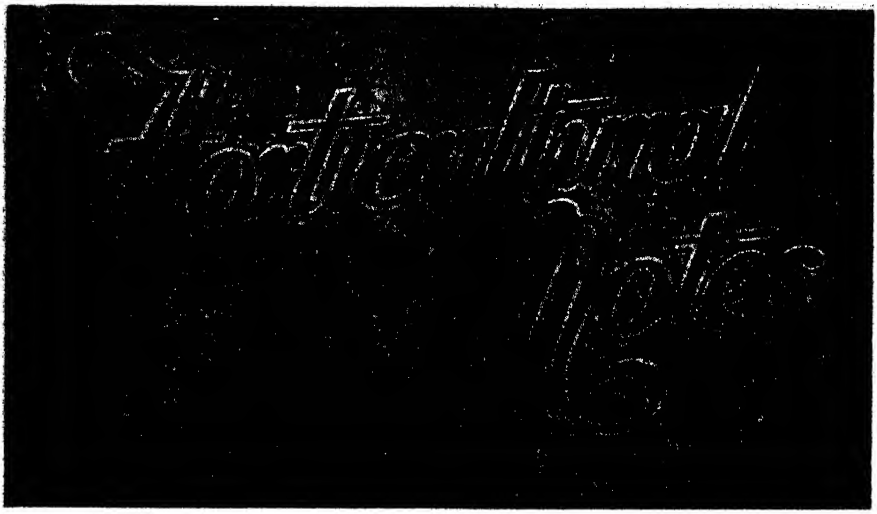
Fence posts are most effectively treated with creosote by impregnation under pressure. This is seldom practicable on the farm, but a satisfactory alternative method is to immerse the lower portion of the posts in a tank containing hot creosote. An empty 44-gallon oil drum, from which the top has been removed, is placed on fire-bars raised from the ground, and the posts are placed in the drum, which is then almost filled with creosote. A fire is lit under the drum the contents of which are heated to a temperature just exceeding 200 deg. F. and maintained at this temperature for about four hours. The drum is then either allowed to cool down or the posts can be quickly transferred to a second drum containing cold creosote and left for a few hours. In both cases the creosote is drawn into the timber as it cools.

If the heat treatment is not practicable two coats of creosote should be brushed onto the posts, a day being allowed to elapse between treatments.

[*Photo.: "The Farmer and Stock-Breeder," England.*

Plate 17.

A SILO MADE WITH SACKS AND PIG NETTING.—One of numerous types of emergency silos now in use in Great Britain as war time improvisations. The sacks are hung on the inside and treated with: Cement, 12 lb.; lime, 2 lb., salt, 1 lb.; and alum, ½ lb.; all in 1½ gallons of water. The cost of this silo was 25s. and it holds about 30 tons.



Apple and Pear Varieties.

ORCHARDISTS in the Stanthorpe District who may be planning a planting programme are advised to place their orders with reliable nurserymen. Early ordering ensures early delivery of the young trees.

As regards varieties to plant, the Granny Smith is likely to be the best commercial apple for many years to come. If reasonably well treated, it will give a good crop every year.

Some growers are inclined to think that the market will be overloaded with Granny Smith apples when young trees already planted come into bearing. This is not likely to happen.

The Stanthorpe Granny Smith is equal to if not superior to any grown in the Commonwealth. The keeping qualities are good, and far more should be cold stored than at present. Stanthorpe applegrowers should try to supply the requirements of their own State with Queensland-grown apples as long as possible by using the available cold-storage facilities.

If the Granny Smith crop in the Stanthorpe district were doubled, or even trebled, there should be no difficulty in marketing the fruit at existing or even enhanced prices.

In addition to the Granny Smith, which should be the main variety, Delicious, Lalla (Red Delicious), Winesap, and Red Statesman are good types.

Red Statesman and, in addition, Dougherty are eminently suitable for the late "private order" trade. Growers who specialise in this trade should cater for their customers over as long a period as is possible. Stocks are frequently exhausted long before they should or need be, and then supplies have to be drawn from elsewhere.

The Gravenstein is a good early dessert apple well worth growing. On account of its susceptibility to gnarl or twist, it is advisable to grow a scaffold tree of another strong-growing variety, such as Delicious, and then rework with Gravenstein scions from selected trees free from the trouble.

Growers should be wary of planting new varieties of apples. Generally it is a good plan to plant only standard varieties and let someone else do the experimenting. Though new varieties may have good characteristics, they are seldom better than those already grown, and being unknown to the trade or the householder the fruit is viewed with suspicion and is difficult to market.

As regards pears, the best commercial varieties are Williams, Bon Cretian, Packhams, Triumph, and Beurre de Box—all are good growers and croppers.

The Winter Cole is a late-maturing variety which is popular in the other States. Stanthorpe growers should, however, limit their plantings of this variety on account of possible fruit fly attacks at the end of the season.

GLADIOLUS THRIPS.

The gladiolus thrips is again active in southern districts, and in some gardens and nurseries the present crop of blooms will be of little value while subsequent crops will require protection from the pest.

The insect is a typical fringe-winged thrips about one-fifteenth of an inch in length, and dark-brown, sometimes almost black, in colour. Normally both the adults and the small yellowish larvae are confined to the more sheltered parts of the flower spike or the growing point, and the bulk of the injury is produced before the leaf or flower spike is unfurled. Colonies of larvae may often be found in the small spaces between the closely folded leaves of the plant, and in the as yet unopened flower buds. The distinctive injury consequently often follows feeding on these younger parts of the plant prior to their emergence. Typically, symptoms are an uneven silvering on the surface of the leaves, malformations in and discolourations of the flower spike, and a general bedraggled appearance of the plant. Though the damage to the plant is obvious, a secondary effect is lack of vigour in the corms which is frequently not appreciated. Any setback to the plant has an adverse effect on corms taken from it, and thrips injury is no exception to the rule. Control measures are therefore necessary, not only for the current season's crop, but also for that of the following year.

As with most species of thrips, reproduction is very rapid and populations may build up quickly to injurious levels. Continuous attention is therefore necessary, for it is much easier to retain control if treatment is applied before the plants are more or less "alive" with the insects. Similarly, corm protection is desirable to ensure freedom from infestation when planted out in the field. The essentials in control are therefore three:—

(*a*) Corms should be fumigated in paper bags at the rate of 1 oz. napthalene per 100 corms for a period of one week before being stored during the off season. A second treatment should be given just prior to planting out in the following season. If corrosive sublimate (1-1,000 for one hour) treatment is given before planting out, the second fumigation may be omitted.

(*b*) When planted out suitable sprays should be applied as soon as the thrips appear, and at weekly intervals thereafter. If an outbreak was experienced in the previous season, it is better not to wait for the appearance of the thrips but to apply an initial treatment when the plants are about 6 in. high. The most efficient spray contains Paris green 1 oz., brown sugar 2 lb., and water 3 gallons. A mist spray is desirable and it is important to agitate the contents of the pump frequently to ensure an even discharge of the toxic ingredient, Paris green. The cost of this spray is not excessive, but it has the disadvantage of occasionally burning the leaves. A more expensive spray, suitable perhaps for garden purposes, is said to be equally effective, and at the same time less harmful to the plants. It contains tartar emetic 2 oz., brown sugar ½ lb., and water 3 gallons.

The derris wet sprays provide a further alternative method of dealing with the thrips, and, although they do not offer maximum efficiency they are relatively inexpensive and convenient. Derris sprays should be mixed to the normal strength as recommended by the manufacturers and applied to the plants weekly.

(*c*) Where possible plantings should be arranged to allow a break of some months between seasonal operations, volunteer growth being suppressed throughout. In the absence of field hosts, the pest population will thus be at a minimum when corms are planted.

RIPENING BANANAS.

To ripen bananas on a large commercial scale a properly constructed room, or rooms, with insulated walls are necessary. Probably the most convenient size for such a room would be 12 ft. long by 8 ft. wide by 7 ft. 6 in. high, such measurements allowing for 100 cases capacity. Factors that must be taken into consideration when building ripening rooms are insulation, air circulation, ventilation, cooling, heating, and humidity control. Details are set out in the C.S. and I.R. Bulletin, No. 64, which is available to anyone interested.

To ripen bananas for home consumption, or a small local trade, is an entirely different proposition. Directions are as under:—

Allow the fruit to become fully matured prior to cutting. After harvesting, cut the hands off and allow them to drain for one hour. Obtain a 50-lb. tea chest

or similar box. Stand it upon two pieces of 3-ft. by 2-in. timber to permit a current a air to pass between it and the floor. Pack the hands of bananas carefully round the inside of the chest, being sure to leave the centre open. Next, place a small handful of carbide in the centre of the chest and cover over in a manner that makes the inside of the chest or box as near to airtight as possible. Two or three thicknesses of canvas, or four thicknesses of corn sacks are usually satisfactory.

Take the covering off after sixteen hours and recharge by placing another small handful of carbide on the floor of the chest. Re-cover it and allow it to stand for a further twelve to sixteen hours, after which uncover it and the fruit then will be almost ready for sale. If not quite ready, cover it but without carbide.

In very warm weather, only one application of carbide may be necessary. Ventilating the chest after sixteen hours is very necessary. Keep the chest in the shade away from the direct rays of the sun.

MARKETING CAULIFLOWERS.

Cutting.—There should be no difficulty in marketing cauliflowers to the best advantage. The main stalk is cut a short distance below the base of the leaf stalks. This short length of stalk gives protection and prevents the leaves from breaking away. All first quality cauliflowers should be marketed with the leaves intact, as this prevents the heart from being damaged in transit.

Containers.—A clean chaff sack is the best container, being light and airy. Corn sacks, unless new, are usually unsuitable.

Packing.—The cauliflowers should be packed with the leaves brought together to protect the heart. This assists in preventing bruising and discolouration, keeping the heart white and attractive and in a fit condition to sell at high values.

Grading.—First and second quality cauliflowers should be packed separately. Each bag should contain as near as possible cauliflowers of the same size and quality. Mixed sizes do not sell as well as graded. Any cauliflowers showing leaf damage should be packed as second grade.

Branding.—Where possible, markings should be placed on the bags before filling. Stencils suitable for doing this are easily procured, and save time. The grower's name, or mark, and the number of cauliflowers in the bag should be conspicuously placed on the side of the bag. This makes identification easy, and often saves unnecessary handling.

Packed bags should not be used as a seat when carting cauliflowers.

RESOILING RAIN-WASHED ORCHARD LAND.

Repairing the damage caused by heavy rains scouring gutters through the orchard is an operation requiring considerable thought, if the work is to be permanent. A repetition of the occurrence is inevitable where the work has been done haphazardly.

Land denuded of the surfact soil presents a hard surface with which the replaced soil will not readily combine. Realisation of this important fact is one of the essentials of a successful job.

Whatever method is employed to repair the damage by replacing soil, it is of the greatest importance that the exposed hard areas should be treated first. Where practicable, the subsoil plough is the best implement to use, but any strong-toothed implement which will break up the surface will serve the purpose. Besides assisting in drainage, this will allow the overburden of replaced soil to incorporate with the subsoil.

If, however, repairing the damaged area entails very much labour, it may be advisable to commence resoiling at the higher levels first. If this is not done, and heavy rain interrupts the work, the undiverted water may again flow down the gutters and carry away the replaced soil on the lower portions.

For general purposes, and where soil can be taken from land adjacent to the orchard, a scoop should be used. Unless it is very soft, the ground should be ploughed before scooping, and careful ploughing to an even depth will greatly facilitate scooping.

THE FRUIT MARKET.

J. H. GREGORY, Instructor in Fruit Packing.

STONE fruits are now in full supply on a firm market. Some excellent consignments are being handled and prices are good. The two holiday breaks did not affect marketing because of their mid-week occurrence. Mangoes are in heavy supply, indicating a bumper crop. Southern market prices for mangoes are lower than in previous seasons, although they have been profitable for good quality fruit. Only special varieties are saleable in Sydney and Melbourne. Pineapple values have remained firm, but bananas have eased somewhat.

Prices at the end of December were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 4s. to 6s. 6d.; Sixes, 5s. to 8s.; Sevens, 6s. to 10s.; Eights, 7s. to 11s.; Nines, 6s. to 11s. 3d.

Sydney.—Cavendish: Sixes, 5s. to 8s.; Sevens, 6s. 6d. to 9s.; Eights and Nines, 9s. to 12s.

Melbourne.—Cavendish: Sixes, 8s. to 11s.; Sevens, 9s. to 12s.; Eights and Nines, 12s. to 14s.

Brisbane.—Lady Fingers: 2½d. to 9d. dozen.

Pineapples.

Brisbane.—Smooths, 5s. to 8s. case; 1s. 6d. to 6s. dozen. Roughs, 5s. to 9s. case; 1s. 6d. to 4s. dozen.

Sydney.—Smooths, 5s. to 10s. case.

Melbourne.—Smooths, 9s. to 15s. case. Bowen pines, 10s. to 16s. case.

Papaws.

Brisbane.—Yarwun 5s, to 7s. tropical case. Local, 2s. to 3s. bushel. Gunalda, 3s. to 3s. 6d. bushel.

Sydney.—8s. to 13s. for special grades.

Melbourne.—10s. to 14s. tropical case.

Mangoes.

Brisbane.—Fancy, 10s. to 12s. Northern Commons, 6s. to 8s.

Sydney.—Fancy, 6s. to 10s. Inferior lower.

Melbourne.—8s. to 12s.

Passion Fruit.

Brisbane.—8s. to 10s. half bushel.

Sydney.—5s. to 10s. half bushel.

Melbourne.—12s. to 20s. half bushel.

CITRUS FRUITS.

Oranges.

Brisbane.—Imported to 13s. case.

Lemons.

Brisbane.—Gayndah, 20s. to 25s. case.

STONE FRUITS.

Plums.

Brisbane.—Burbank, 5s. to 8s. half bushel. Angelina, 6s. to 10s. half bushel. Santa Rosa, 5s. to 8s. half bushel.

Nectarines.

Brisbane.—3s. to 7s. half bushel.

Cherries.

Brisbane.—5s. to 8s. half bushel.

Peaches.

Brisbane.—2s. to 5s. half bushel.

Apricots.

Brisbane.—6s. to 10s. half bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Gravensteins, 9s. to 11s. William Favourites, 5s. to 9s. Cookers, 5s. to 8s.

Pears.

Brisbane.—Clapps, 5s. to 8s. bushel.

Grapes.

Brisbane.—Roma Muscatels, 5s. to 10s. Local Whites, 2d. to 2½d. lb.

MISCELLANEOUS, VEGETABLES, ETC.

Watermelons.—Brisbane: 4s. to 10s. dozen.
Rockmelons.—Brisbane: 1s. to 4s. dozen.
Cabbages.—Brisbane: Stanthorpe, 6s. to 10s. bag.
Beans.—Brisbane, 1s. to 4s. bag. Specials higher.
Peas.—Brisbane: Stanthorpe, 5s. to 7s.
Carrots.—Brisbane, 3d. to 1s. bundle.
Lettuce.—Brisbane, 1s. 6d. to 2s. dozen.
Beetroot.—Brisbane, 4d. to 1s. bundle.
Marrows.—Brisbane, 6d. to 1s. 6d. dozen.
Cucumbers.—Brisbane, 3d. to 9d. dozen; 2s. to 3s. case.
Chokos.—Brisbane, 4d. to 9d. dozen.
Pumpkins.—Brisbane, 4s. 6d. to 6s. bag.

Tomatoes.

Brisbane.—Ripe, 6s. to 9s. Inferior lower. Coloured, 8s. to 10s. Others, 3s. to 7s.

LET US SPRAY.

Would you have your young banana
  Suffer blight and come to grief?
Must you leave off for *"manana"
  Deadly spots upon a leaf?
When, in easy way, you may .. .. .. SPRAY!

Would you have this swift infection
  Scourge your fields from "pole to pole?"
Leave you want and desolation
  When it's easy to control
In a way, the only way .. .. SPRAY!

Would you rest in idle manner
  While your plants all droop and die?
When beneath the Control Banner
  You can such disease defy
And, you may, in easy way .. .. SPRAY!

Would you jeopardise your "holding"
  By indifference to this threat?
Heedless of our timely scolding,
  Yet, before the ills are met,
There's a way, a certain way .. .. SPRAY!

Better then be up and doing,
  Crush this menace and be free—
Spend no time in silly mewing,
  Tend to each affected tree
With a will, and in a way .. .. LET US SPRAY!

* To-morrow.

—George B. Wallace, in *The Journal of the Jamaica Agricultural Society.*

NEW DIRECTOR OF DAIRYING.

Plate 18.
MR. E. B. RICE.

Mr. E. B. Rice, a technical officer of the Dairy Branch of the Department of Agriculture and Stock, has been appointed Director of Dairying—after a considerable period of acting service in that capacity—in succession to Mr. G. H. E. Heers, who has retired under the age limit provisions of the Public Service.

Mr. Rice spent his boyhood on the Darling Downs. He was educated at the Harlaxton State School and the Brisbane Technical College. Completing a four-year course at the college, he gained the diploma in industrial chemistry with honours, together with certificates in sugar chemistry and assaying.

In 1922, Mr. Rice entered the Department of Agriculture as a cadet. Specialising in dairy technology, he pursued various courses of study, including agriculture, animal husbandry, and dairy bacteriology, and gained certificates for proficiency in milk and cream testing, buttermaking, and cheesemaking.

In 1934-35, under the scheme then operating for the interchange of technical officers, Mr. Rice was attached to the Dairy Branch of the Department of Agriculture of New South Wales. In addition to gaining considerable practical experience of the dairy industry of another State, he completed a course in dairy bacteriology at the Sydney University. In 1936 he was selected for a course of advanced study and research at the National Institute of Research in Dairying, University of Reading, England. While abroad, he travelled extensively in Great Britain, Eire, Germany, Denmark, and Holland, observing dairy practice, research activities, and marketing methods in those countries.

As a member of the Cheese Investigation Committee, Mr. Rice was associated actively with the recent reorganisation of the cheese industry on its technical side, and which has led to a remarkable improvement in cheese quality.

MR. HEERS' CAREER.

The new Director's predecessor, Mr. G. H. E. Heers, has had a meritorious career of many years' duration in the service of the Department of Agriculture and Stock, to which he was appointed as a dairy inspector in 1907. From the position of Senior Grading Inspector he was appointed Director of Dairying on the retirement of Mr. Chas. McGrath in 1935.

Mr. Heers has been associated with every progressive development in the Dairy Branch and assisted in the drafting of "*The Dairy Produce Act of* 1920," the most advanced legislation of its kind at that time. In this and many other ways he contributed materially to the establishment and maintenance of high standards in the Queensland dairy industry, which now approximates £10,000,000 in annual value and which is ever adding to the volume of our export trade. No limit has yet been set to its expansion in this State.

Among other offices held by Mr. Heers in the course of his official career were Chairman of the Dairy Cattle Improvement Board, Chairman of the Dairy Factories Investigation Committee, and membership of the Milk Tribunal, the Cheese Advisory Board, and of the Rail and Road Transport Committee. As a judge of butter and cheese quality he has few, if any, equals in the Commonwealth.

Plate 19.
MR. G. H. E. HEERS.

A keen horticulturist, Mr. Heers is regarded as one of the highest authorities on rose growing in Queensland. His present land interests are bound up with the well-known Pacific Nurseries at Manly, near Brisbane. As a young man he was a noted all-round athlete, excelling in field sports, particularly cricket and football, and at one time enjoying the distinction of being among the foremost of distance footrunners of his day. He also excelled in aquatic sports and was one of the founders of the Manly Yacht Club.

Mr. Heers, in his retirement from official life, continues to enjoy the good will of every section of the dairy industry—including producers, manufacturers, and shippers—in the development of which he played for so long a leading part.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production charts for which were compiled during the month of November, 1940 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORNS.			
	MATURE COW (STANDARD, 350 LB.).			
Sunnyside Empress 33rd	P. Moore, Sunnyside, Wooroolin	12,307·1	434·579	Bruce of Avonel
Evansvale Carey	J. F. Evans, Malanda	9,689·35	397·297	Malanda of Glenore
Merravale Tulip 9th	W. Soley, Malanda	10,606·7	358·819	Greyleigh Honorarium
	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
Sunnyside Empress 65th (365 days)	P. Moore, Sunnyside, Wooroolin	9,928·25	369·319	Cosey Camp Rupert
Bingleigh Melody's Darling 2nd	J. C. Meier, Mount Mort	7,473·5	303·364	Blacklands Patrol
Corunna Ideal	J. H. Anderson, Fairvale, Southbrook	6,954·95	286·517	Fairvale Emperor
Faversham Prim 2nd	Messrs. Couchman Bros., Warra	6,771·54	277·328	Faversham Rex
*Sunnyside Marvelette 2nd	P. Moore, Sunnyside, Wooroolin	7,699·9	274·892	Cosey Camp Rupert
Kyabram Jewel 2nd	A. H. E. Black, Kyabram, Kumbia	6,228·06	264·087	Berry Joker
Balcarres Queen	E. E. Reeve, Balgowan, Muldu	5,447·85	242·82	Morden Signal
Cedar Grove Model 19th	T. Ryan, Allora	6,894·35	236·349	Cedar Grove Trump
Faversham Bluebell	Couchman Bros., Warra	5,515·78	235·79	Faversham Rex
	JERSEY.			
	MATURE COW (STANDARD 350 LB.).			
Keystone Dot (251 days)	E. J. Keys, Proston	8,724·3	376·063	Keystone Canon
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Windyway Maiden	Wakefield Bros., Upper Barron, Atherton	5,628·4	320·105	Royal Emblem 2nd of Rosedale
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Lermont Bella	J. Schull, Lermont, Oakey	5,196·45	259·945	Woodside Golden Volunteer
Peeramon Fairy Dove	A. H. O. Koppen, Peeramon	5,563·5	317·304	Trinity Popcorn 2nd's Pioneer
Windyway Greta Garbo	Wakefield Bros., Upper Barron, Atherton	4,172·4	239·921	Hero of Windyway

* Sunnyside Marvelette 2nd is a Senior 2 Years (Standard 250 lb.), and not a Junior 2 Years.

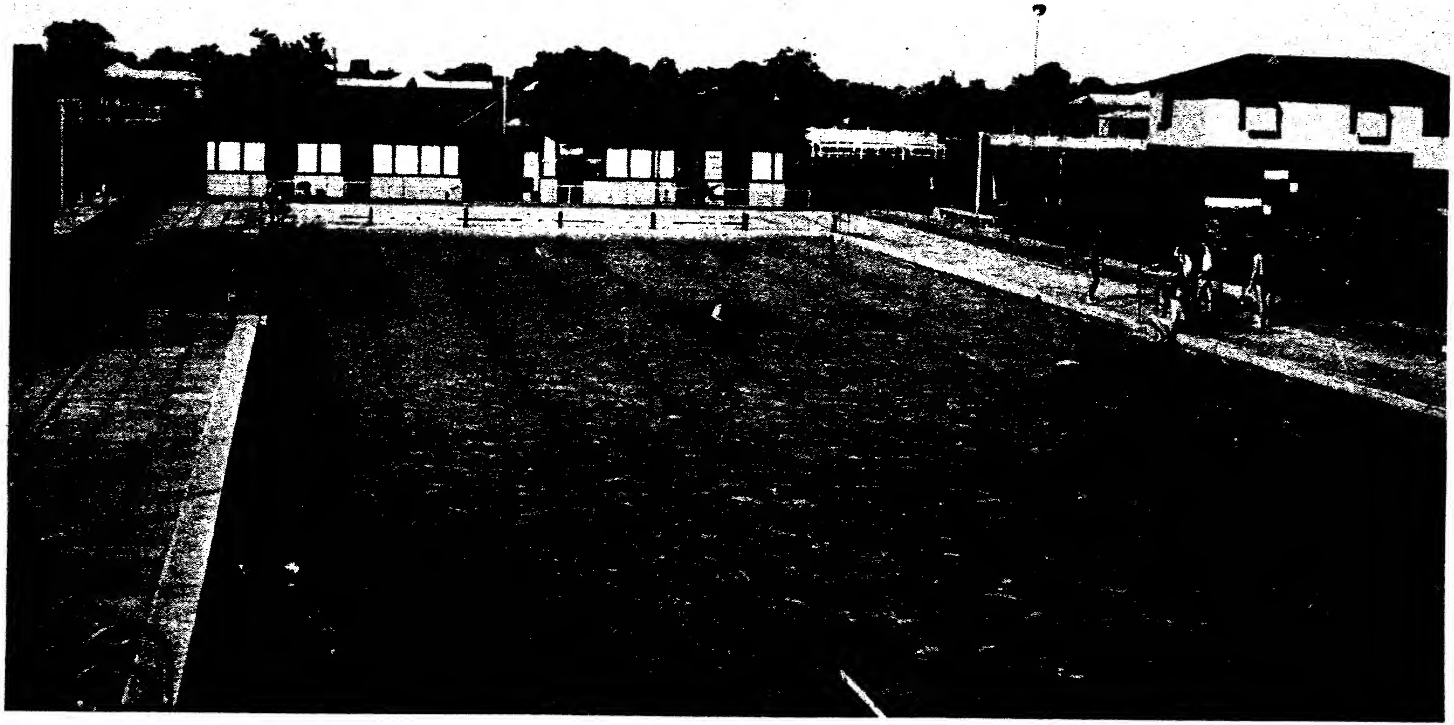


Plate 20.

THE SWIMMING POOL AT DALBY.—Dalby, "The City of the Plains," is now one of the most important stock markets in the Commonwealth. Wool, grain, and dairy production are the main industries of the Northern Darling Downs, of which Dalby is the thriving capital. Water for the public baths is obtained from a deep bore in the centre of the town. Within a short motor drive are the Bunya Mountains, one of the finest scenic regions of the State. The Dalby district is renowned for its superb winter climate.

[*Photo.: Department of Agriculture and Stock.*

General Notes

Staff Changes and Appointments.

Messrs. J. C. Gilpin (Department of Agriculture and Stock) and H. Bell (View street, Wooloowin) have been appointed inspectors under *The Diseases in Stock Acts, The Slaughtering Act,* and *The Dairy Produce Acts,* Department of Agriculture and Stock.

Mr. F. W. Blackford, assistant research officer in the plant pathological section, Division of Plant Industry (Research), will be transferred to Atherton early in the new year.

Mr. K. B. Tomkins, Westgrove, Injune, has been appointed an honorary protector of fauna.

Constables R. C. J. Kennedy (Wandoan) and J. P. W. Frederiksen (Oxley) have been appointed also inspectors under *The Slaughtering Act.*

Mr. D. R. L. Steindl, assistant pathologist, Bureau of Sugar Experiment Stations, has been transferred from Bundaberg to Brisbane.

Miss P. Thorburn, assistant cane tester, has been attached to the Fairymead mill for the remainder of the current sugar season.

Sergeant F. W. Zeller (Cracow) has been appointed also an inspector under *The Slaughtering Act.*

Bingera Mill Levy.

Regulations have been issued under *The Primary Producers' Organisation and Marketing Acts* empowering the Bingera mill suppliers' committee to make a further general levy for administrative purposes on suppliers of sugar-cane to the Bingera mill at the rate of one farthing per ton.

Plane Creek a Wild Life Sanctuary.

An Order in Council has been issued under *The Fauna Protection Act* declaring Plane Creek and its banks to be a sanctuary.

Papaw Levy.

The Papaw Levy Regulation, which came into force in December, 1938, for a year and was extended in 1939, has been again extended for a further period of twelve months as from 9th December, 1940.

The Law Relating to Margarine Manufacture and Sale.

A Proclamation issued under *The Margarine Acts Amendment Act of* 1939 provides for its enforcement as from the 1st January, 1941.

Weight of Hay Bale Battens.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock) has called the attention of growers of hay to the provisions of *The Stock Foods Acts,* 1919 *to* 1935, which prescribe that the total weight of battens used on bales of hay shall not exceed 10 per cent. of the gross weight of the bale.

A recent inspection of hay offered for sale in Queensland revealed that, in the main, battens were below the weight allowed, but, unfortunately, a number of bales were loaded with one or more battens of excessive weight, some weighing as much as 11 lb. each. In order not to exceed the maximum allowed and to provide for a uniform pack, the total number of battens per bale should not exceed eight. Each batten should not be of greater length than the bale and should not be more than 3 inches by ½ inch.

The Minister also called attention to the penalty clause in *The Stock Foods Acts* which provides for a fine of £20 for the first offence, £50 for the second offence, and £100 for subsequent offences relating to the use of battens of a weight and size in excess of the prescribed maximum.

It is the intention of the Department, said the Minister, to take necessary steps without further notice to enforce these provisions.

Peanut Levy.

An Order in Council has been issued under *The Peanut Industry Protection and Preservation Act of* 1939, which directs the Peanut Board to make a levy for the purposes of section 34 of the Act on growers of peanuts at the rate of one-eighth penny per lb. weight of peanuts in shell delivered to the Board, whether for sale or for grading by the Board, that shall have been harvested during the period commencing on the 18th December, 1939, and ending on the 27th August, 1947.

Pig-raising.

New and expanding export markets for pig products have opened, and departmental policy has been shaped in accordance with the determination to take full advantage of trade expansion opportunities as they occur. In comparison with the figures of twenty years ago, pig production has trebled in Queensland. Its present annual value is computed at £1,500,000. The Queenstate Stud Piggery, established by the Department at the Queensland Agricultural College three years ago, has continued to exert a beneficial influence on the pig industry. The progeny of the foundation stock has been distributed widely within the State under reasonable conditions for farmers as to price and transport. The community boar scheme, through which pedigreed animals are made available for farmers, is already fulfilling the purposes of its foundation.

—*R. P. M. SHORT, Under Secretary, in his Annual Report.*

QUEENSLAND SHOW DATES FOR 1941.

January.

Pittsworth Bushman's Carnival 27th

February.

Stanthorpe ... 6th to 8th
Killarney ... 14th and 15th
Warwick ... 18th to 20th
Clifton ... Postponed

March.

Allora ... 7th and 8th
Pittsworth ... 11th and 12th
Millmerran ... 14th
Goombungee ... 15th
Toowoomba ... 24th to 27th

April.

Dalby ... 1st and 2nd
Tara ... 4th and 5th
Chinchilla ... 8th and 9th
Miles ... 16th
Nanango ... 23rd and 24th
Kingaroy ... 30th and 1st and 2nd May

May.

Monto ... 1st to 3rd
Longreach ... 5th to 7th
Blackall ... 12th and 13th
Gayndah ... 14th and 15th
Murgon ... 15th to 17th
Beaudesert Show ... 14th and 15th
Beaudesert Campdraft ... 16th and 17th
Mitchell ... 21st and 22nd
Ipswich ... 27th to 30th
Gympie ... 29th to 31st
Kalbar ... 31st

June.

Lowood ... 6th and 7th
Maryborough ... 5th to 7th
Childers ... 9th and 10th
Boonah ... 11th and 12th
Bundaberg ... 12th to 14th
Gladstone ... 18th and 19th
Rockhampton ... 24th to 28th
Toogoolawah ... 27th and 28th

July.

Proserpine ... 4th and 5th
Nambour ... 10th to 12th
Townsville ... 15th to 17th
Cleveland ... 18th and 19th
Cairns ... 22nd to 24th
Innisfail ... 25th and 26th
Home Hill ... 31st July and 1st August

August.

Pine Rivers ... 1st and 2nd
Royal National ... 11th to 16th

September.

Imbil ... 5th and 6th
Rocklea ... 13th

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.

Chaff Burr.

G.S. (Glen Allyn, Malanda)—

Your specimen forwarded is Chaff Burr (*Achyranthes aspera*), a native plant which also has a wide distribution through India, Malaya, and the islands of the Pacific. It is moderately common in some parts of North Queensland, and is carried about by stock from one place to another. We cannot say, however, that we have actually seen it a pest in any locality. It is not known to possess any poisonous or harmful properties, but seems to be left untouched by stock, and it might be just as well to eradicate it if only a few plants are present.

Indian Jujube or China Apple.

G.H.R. (Longreach)—

The specimen is the Indian Jujube or China Apple (*Zizyphus Mauritiana*). This plant was originally described from Mauritius, hence the specific name, but is also widely spread in India and South-Western China. It has become naturalised and somewhat of a nuisance about Rockhampton and Townsville, and some other northern coastal places. Its fruit is pleasant to the taste, and when grown properly is quite a good shade tree.

Blue Mauritius Bean.

C.C.B. (Townsville)—

The specimen is the Blue Mauritius Bean (*Mucuna aterrimum*). This bean is much cultivated in the sugar lands of North Queensland as a green manure crop. We have not known anybody to eat either the young beans or the seeds. They are, in fact, supposed to be slightly deleterious. The plant is very closely allied to the Florida Velvet Bean, sometimes cultivated as a fodder in Queensland.

"Justicia."

W.A.K. (Clermont)—

The specimen represents *Justicia procumbens*, a small native plant with a very wide distribution in Queensland, but for which we have not heard a common name. The generic one, Justicia, however, is short enough for general use.

We were very interested in your remarks about this plant, and it is evidently a valuable fodder. It belongs to the family Acanthaceae, and we have had several reports about different members of this family being valuable as fodders.

Paspalidium.

W.D.S. (Drillham)—

The specimen is *Paspalidium distans*, a native grass which is fairly common, but for which we have not heard a local name. The generic name, Paspalidium, however, is short enough for general usage.

We have several species of Paspalidium in Queensland, and previously they were included in the larger genus Panicum. One is the Brigalow Grass, another with larger seeds is the Shot or Sago Grass, common on open downs country. The Brigalow Grass and the one you sent seem to grow best in rung brigalow country, as they like a bit of shelter. They come back, however, after a time, when the country has been cleared. It is quite a good grass, and worthy of encouragement, but we think you will find it will spread naturally.

Plants from Innisfail Named.

J.T.L. (Innisfail, N.Q.)—

1. *Bowenia spectabilis,* a Cycad. Members of this family are commonly called Zamia in Australia. The one you send is sometimes known as "Zamia Fern." It is reputed to cause rickets in stock.
2. *Digitaria longiflora,* a native grass for which we have not heard a local name.
3. *Digitaria adscendens,* Summer Grass. A very common grass in Queensland, mostly occurring as a weed of cultivation. In the ordinary pasture it favours rather sandy soils. Species of Digitaria for the most part are quite good fodders.
4. *Brachiaria* sp. This is a Brachiaria we are not too sure of. It is close to *Brachiaria milliformis,* but has differences. Could you send more material? Practically all the Brachiarias are useful fodders for stock.
5. *Passiflora alba,* the White Passion Vine. This Passiflora is rather different from the others in that it contains no prussic-acid-yielding glucoside. Feeding tests proved it to be poisonous to stock, but the poisonous principle is of a cumulative nature, and animals have to feed on the vine for some weeks before effects are noticeable.
6. *Drymaria cordata.* A tropical plant closely allied to the European Chick Weed.

Plants Identified.

R.M. (Gladstone)—

The specimens have been determined as follows:—

The larger leaf (*Aralia Guilfoylei*),

The smaller leaf (*Aralia geraniifolia*).

These plants are quite different from the *Acalypha.* They strike readily from cuttings during the summer months.

Asystasia.

D.F. (Dimbulah)—

The specimen is *Asystasia coromandeliana,* a native of India. We have not heard a common name applied to it, but the generic name, Asystasia, is short enough for general usage. We have previously received specimens of this shrub as a useful feed for cattle. It is reported in India to be used as greens in the same way as silver beet or spinach. It belongs to the family Acanthaceae, and we have noticed on several occasions that plants of this family, both native and in garden culture, are freely eaten by stock. The plant should propagate quite easily from cuttings, if it does not set seed with you.

Mexican Poppy.

G.M. (Brisbane)—

The specimen forwarded is the Mexican Poppy (*Argemone mexicana*), a very common naturalised weed in Queensland. Both in Australia and abroad, the plant has been suspected of poisoning stock. In addition to its prickly nature, however, the plant is very bitter and is very rarely eaten by stock to any extent. The seeds are poisonous, and cases are on record where people in India suffered severe vomiting and purging after using a cooking oil adulterated with argemone oil. In spite of these references, however, actual feeding tests in Australia conducted at the Veterinary Research Station, Glenfield, New South Wales, some years ago yielded negative results.

Hyptis—A Common Townsville Weed and its Possible Uses.

T.G.R. (Ayr)—

Thanks for specimens of *Heliotropium indicum.* We have sent you a piece of Hyptis. You will probably recognise the plant, as it is a fairly common weed about Townsville, and probably Ayr. Fishermen on the Strand at Townsville frequently strew it about and burn it to drive away mosquitoes. A correspondent is interested in the manufacture of mosquito coils, and is looking for plants other than those commonly used. We have suggested to him the possible usefulness of Hyptis for that purpose.

Bellasombra Tree.

E.M. (Gayndah)—

The specimen is the Phytolacca or Bellasombra Tree (*Phytolacca dioica*). The leaves of this tree are generally regarded as an excellent green feed for all classes of stock. Some farmers make a practice of cutting down the branches in dry times and feeding them to cattle.

Bindweed. Chicory.

C.C.D. (Allora)—

The smaller specimen is the Bindweed (*Convolvulus arvensis*), one of the worst weed pests that has appeared on the Darling Downs in recent years, and, unfortunately, it is much on the increase. Every bit of the plant, when broken, is capable of forming a fresh growth. We think your best means of controlling it would be weak arsenical solutions applied repeatedly. Mr. W. Deacon, when Minister for Lands, informed us that he had found pigs very useful in controlling the plant, as they were very fond of the white underground runners when these were turned up by the plough or spade.

The larger weed is Chicory (*Cichorium Intybus*). This plant has become rather a pest on the Darling Downs. Chicory runs out and becomes a weed, losing the enlarged tap root, and is of very little value. Several forms of it, of course, are cultivated in Europe as a source of the adulterant of coffee on the one hand, and the leaves for greens on the other. For this latter purpose, the leaves are always blanched before being eaten raw.

Brigalow and Belah as Fodder for Stock.

E.A.G. (Columboola)—

Brigalow is very inferior as a fodder, but is eaten by both sheep and cattle, particularly sheep, in its very young stages. As a matter of fact, sheep have been found quite useful for keeping down Brigalow suckers. They prefer them when just coming through the ground, but if they get a few inches high, the suckers become coarse and unpalatable. We think you would experience trouble if you fed much mature Brigalow.

Belah is quite good fodder. In feeding Belah, it is frequently noticed that stock will clean up one or two trees, and leave others. This preference is possibly due (we cannot be sure) to the fibrous content of the leaf and branchlets. Dr. M. White, Nutritional Adviser of the Department of Agriculture and Stock, informs us that a good test of Belah is that if the leaf can be bent in a hoop without cracking, then it is too fibrous to be fed in a dry time. On the other hand, if the Belah leaf or branchlet can be bent round in a hoop, and cracks, it is suitable for feeding.

Footrot. Sudan Grass Poisoning.

C.H.R. (Proston)—

1. Treat for footrot with a mixture made up of creosote 1 part, olive oil 2 parts, and turpentine 2 parts. This will give better results than your cattle gall mixture. The mixture recommended should be applied to affected parts with a brush. Any overgrown horn of the foot should be removed. If any pus can be detected in the foot the overlying horn should be removed in order to allow drainage. Actually, in nearly every case of footrot the presence of pus cannot be detected, and the application of creosote mixture in the cleft of the hoof and on any swollen areas daily gives good results.

2. Sudan grass poisoning is treated by drenching with hyposulphite of soda (ordinary hypo.), which can be obtained from any chemist. Drench with 2 oz. of hypo. in sufficient water to form a drench and repeat at half-hourly intervals as required. Animals in the final stages of the poisoning and too far gone to drench should be treated by puncturing the left side with a trocar and canula as for bloat. Remove the trocar and leave the canula in position, then pour the mixture of 2 oz. of hypo. in sufficient water to dissolve it down the canula so that it passes directly into the paunch. Leave the canula in position and repeat at intervals of about twenty minutes as required.

VETERINARY ADVICE.

(From the outgoing mail of the Office of the Director of Veterinary Services.)

Warts on Calves.

E.H.R. (Cootharaba).

Warts are small solid growths arising on the surface of the skin or mucous membrane, the cause of which is not definitely understood. Warts do not apparently affect the health of the animal adversely, and are only important in that they are unsightly, and by their position may cause trouble mechanically. In calves and young cattle they are frequently extremely numerous and may spread over the whole of the head and neck, this type apparently being contagious from one beast to another. Another common site is on the teats of cows.

Treatment will depend on the number, shape, and position of these growths. Small growths occurring singly on the skin of the body may be cut off with a sharp pair of scissors or, if attached by a stalk they may be removed by tying a piece of strong sewing silk tightly round the stalk and allowing the growth to rot off. Where large growths occur extending over big areas of the body such as the head and neck, it is necessary to give tonics and nourishing food as well as local treatment. Various remedies may be used for applying to the growths, crude castor oil being one of the most common, particularly when the warts occur on the teats. Other remedies for use when large areas are affected are coal tar applied daily for three or four days, or glacial acetic acid, applied every third day.

Impaction. Sorghum Poisoning. Blight.

E.C.S. (Lawgi, via Rockhampton).

Impaction.—In the case of impaction, affected animals show signs of restlessness, lying down and getting up frequently, show little desire to feed and do not chew the cud. The production of milking cows drops suddenly. Many animals may be sick for three or four days and then recover without treatment, but as the majority need attention it is wise to treat animals as they become affected. If the animal is not weak from emaciation, a drench of epsom salts, 1 lb., with ground ginger 2 oz., in one and a-half pints of water is recommended. Enema treatment with soapy water also is beneficial. Where animals are very emaciated it is unwise to give purgative drenches. These animals should be given powders made up of powdered nux vomica ½ oz., powdered ginger 1 oz. Give one powder night and morning for three days. The powder should be mixed with treacle and placed on the back of the tongue. If impactions are not relieved, the walls of the stomach lose tone, normal movements cease and gases collect, causing the common symptoms of hoven or bloat to develop. Animals that are not weak can be treated with 1 to 2 oz. of oil of turpentine in 1 to 2 pints of raw linseed oil. This should be followed next day with a drench of epsom salts, 1 lb. in 1½ pints of water. As it is unwise to purge weak animals, they should receive powders made up of powdered nux vomica ½ oz., powdered ammonium carbonate ½ oz., powdered ginger 1 oz.—one powder night and morning for three days. Acute cases should be treated by puncture with the trocar and canula, and if the condition recurs at intervals, give a course of the powders of nux vomica, ammonium carbonate, and ginger. Naturally, a course of these powders is intended for special animals rather than for the wholesale treatment of many.

Sorghum Poisoning.—Sorghum poisoning is treated by dosing the animal with hyposulphite of soda, the ordinary photographic hypo stocked by any chemist. Animals in the final stages cannot be drenched, but may be treated as follows:—The left side is punctured with a trocar and canula as for ordinary bloat, the trocar withdrawn and the canula left in position. A mixture of hypo 2 oz. in sufficient water to dissolve it is then poured down the canula so that it goes directly into the paunch. Leave the canula in position and repeat dosage at intervals of 15 to 20 minutes according to the progress of the animal. Even very bad cases will usually get on to their feet about an hour after treatment has commenced. Once the animal is up, keep it under observation in case further treatment is necessary. Animals in the early stages can be drenched quite easily, using 2 oz. of hypo in sufficient water to make a drench.

Treatment may be repeated if necessary, according to the progress made.

Blight.—Blight can be treated with a mixture of zinc sulphate 2 per cent and boracic acid 2 per cent. in sterile water. This can be made by dissolving two level teaspoons of zinc sulphate and two level teaspoons of boracic acid in half a pint of water that has been boiled and allowed to cool. Treat affected eyes, using a syringe with a short length of rubber tubing attached to the nozzle and use just enough to wet the inside of the lids and the eye proper. Where possible, treat twice daily. A generous application of vaseline to the outside of the lids and adjacent parts of the face is advisable to prevent scalding by discharges and to keep flies away.

Sickness in Calves. Sudan Grass Poisoning.

T.J.C. (Wallumbilla)—

Sickness in Calves.—In the case of colic, the calf suddenly becomes sick, lies about with head stretched round to the flank and shows no desire to feed. Some recover, but many die after two or three days. They seem to suffer pain during the illness. For treatment, castor oil is very effective in doses of 2 to 4 oz., depending on the size and age of the calf. This should relieve the condition and the calf usually shows a return of appetite. It should then be fed on whole milk for a few days. Gradually change on to separated milk. If the ingestion of dry feed cannot be avoided, the feeding of molasses can be used as a preventive. Some animals may be slow to recover and be inclined to suffer frequent mild attacks. These should be given a powder consisting of nux vomica 1 oz., ammonium carbonate 1 oz., ginger 3 oz. Divide this into six powders and give one night and morning. Mix the powder with treacle or molasses and place on the tongue.

For Blight, see answer to E.C.S.

When animals are suffering from sudan grass poisoning treatment consists of drenching with hyposulphite of soda, which is ordinary photographic hypo stocked by any chemist. When animals are too far gone to be drenched, the left side should be punctured with a trocar and canula as for ordinary bloat, the trocar withdrawn and the canula left in position. A mixture of hypo 2 oz. in sufficient water to dissolve it is then poured down the canula so that it goes directly into the paunch. Leave the canula in position and repeat dosage at intervals of 15 to 20 minutes, according to the progress of the animal. Even very bad cases will usually get on to their feet about an hour after treatment has commenced. Once the animal is up, keep it under observation in case further treatment is necessary.

For animals in the early stages of poisoning drenching is all that is necessary. Use 2 oz. of hypo in sufficient water to make a drench. Treatment may be repeated if found necessary according to the progress made.

Blood Scour in Calves.

J.L.P. (Milmerran)—

For blood scour in calves, the following treatment is suggested:—

(1) Isolate affected animals from healthy ones.

(2) Sterilise by boiling any utensils which have been used for feeding affected animals and do not use the same buckets for feeding healthy and sick animals.

(3) Calves that are scouring should be starved for 24 hours—i.e., receive no milk over that period—dose with 2 to 4 oz. castor oil, depending on the size and age of the calf.

(4) Following the 24 hours period of no milk, put the calves back on the whole milk for a few days; if scouring persists give 1 teaspoonful of chlorodyne in each drink of milk.

(5) Gradually get back on to the original diet, taking about a week to change over. When the calves are again receiving skim milk the addition of lime water would be beneficial. Start off with 2 tablespoonfuls in each drink of milk and gradually increase until they receive 1 breakfastcupful in each feed. The lime water should be continued as part of the feeding as it has a definite preventive value.

We are sending you under separate cover a pamphlet, "Care of the Cow after Calving," which contains some useful information.

How to Sling a Cow.

T.G.M. (Calliope)—

For slinging a cow, the apparatus consists essentially of a broad, strong sheet which passes under the animal's chest and abdomen, supported by a block and tackle or by some other means to a beam overhead. Connected with this there are two strong straps, one passing round the front of the chest and the other passing round the buttocks. These serve to hold the sling in position and prevent the animal from struggling free. The whole is adjustable so that it may fit animals of different sizes. The sling is often made with a metal or wooden bar along each end of the sheet; these bars serve to distribute the weight of the animal along the whole width of the sheet and afford a rigid means of attachment of the slings to the cross-beam to which the chain or rope of the block and tackle is attached.

When slings are to be used, they should be so fixed as to enable the animal to move a little in each direction as it desires. Animals soon learn to lean on the sling and rest their feet; when the sling is drawn so tightly that whenever the animal tries to move itself it is lifted off its feet it becomes irritable through being unable to move and is likely to struggle violently to free itself.

It should be possible to pass a hand under the sling webbing when the animal is standing immediately beneath the centre of the block and tackle; neither the chest strap nor the breeching should be buckled tightly. It is usually necessary to secure the head of the animal with a halter to restrict its movement, and also to supply a suitable manger or other receptacle from which it may feed at ease.

The Orphan Foal.

G.S.M. (Upper Freestone)—

The Rearing of the Orphan Foal.—The foal may, with proper care, be reared on cow's milk. As mare's milk contains much less fat but more sugar than cow's milk, the milk should be modified for a very young foal. Choose milk from a cow in the first part of the lactation period and one giving milk low in fat if possible. Put four tablespoonfuls of lime water and two teaspoonfuls of ordinary cane sugar in a pint jar and then fill it with fresh milk. Feed about a quarter of a pint every hour for the first day or so, warming the milk to 100 degrees F. (blood heat), using an ordinary nursing bottle with a large nipple. The bottle should be carefully cleansed and sterilized. If the foal is doing well, the amount of milk may be gradually increased and the period between feedings lengthened until the foal is fed only four times a day. After a few days unmodified whole milk may be substituted and the foal taught to drink from a bucket. In five to six weeks sweet skim milk may gradually replace the whole milk, and after three months the foal may be given all it will drink three times a day. As soon as possible the foal should be fed solid food, such as crushed or ground oats, bran, a little linseed meal, and legume hay, and it should have the run of a paddock where there is good grazing.

THE USE OF STERILIZED BONE MEAL.

Dr. E. Hirschfeld, M.D., writes under date 3rd December, 1940:—

Many inquiries have reached me, concerning the use of sterilized bone meal, both from pastoralists and dairy farmers. Will you permit me to reply briefly to the points raised by them?

While an adequate supply of phosphates is indispensable to the raiser of beef cattle, it is a matter of even greater urgency to the dairy farmer. The beef-cow supplies as much milk as is required by its calf. The dairy cow is bred in such a way as to produce the greatest amount of milk possible—an amount of milk far beyond the needs of one calf. Cow's milk is exceedingly rich in phosphates; it contains five times more phosphorus than human milk. The reason for such a difference is this: The frame of the calf is built up in a much shorter time than the frame of the infant; hence Nature has enriched cow's milk with a greater wealth of frame-building materials than woman's milk. It is obvious that the drain upon the resources in phosphates of the body of the cow must be correspondingly greater. The milk-cow is a vast spender of phosphates, far more so than the beef-cow; the beef-cow far more so than a woman. In addition, the cow has a double expenditure;

she has to build the calf she is carrying, while at the same time being milked twice a day. Pastures rich in phosphates are needed to make good this double demand; the in-take must keep pace with the expenditure, otherwise the health of the cow is sure to suffer; she stands up to her work at the expense of her body.

Winter and dry spells are the natural enemies of the cow that carries a calf and produces milk. The winter is harmful, because the grasses are seeding in the autumn. Most of the phosphorus is gathered in the seed of the plant; as the seed falls to the ground, the stalk still standing is left without its mineral contents.

Dry spells are harmful in a different way; while the rain falls the phosphorus of the soil is brought into solution, feeds the roots of the grasses and plants, is carried upwards into the green shoots, and renews the supply for the animals grazing upon them. On the other hand, if no rain falls, less phosphorus is furnished to the roots and less phosphorus finds its way above the ground. You will understand why winter plus dry spells mean such a hard time for the dairy farmer. It now becomes his business to supply his cows with the phosphates that his pastures have ceased to furnish.

Phosphates in the form of sterilized bone meal are not expensive. A bag of 100 lb. of calphos prepared at the Abattoirs costs in the neighbourhood of 10s.; this has to be mixed with an equal weight of salt (a bag of salt weighs heavier than a bag of bone meal).

When should the farmer begin to feed bone meal to his herd? The cow, not the farmer, should be the judge of that. The lick ought to be exposed in the sheltered trough, as described in the paper. When the cow feels the need of it she will seek it. She will leave it alone while the pastures feed her.

The lick keeps.

Plate 21.

SOME OF THE SOUTHDOWN STUD FLOCK ON GOLDEN DOWNS, NEAR YANDILLA.

[*Photo.: Lands Department.*

Rural Topics

The Corriedale's High Wool Yield.

As an example of the wool-producing quality of Corriedales, a recent clip taken off nearly 2,500 grown sheep in the central-west of New South Wales is outstanding.

Although grown under conditions which were not good, except in the spring, and despite the fact that a third of the number carried only ten and a-half months' wool, the average weight per sheep was over 11 lb.

In a favourable season, a good Corriedale flock will produce fleeces averaging nearly 12 lb. of high-yielding, well-sought-after wool of a fifty-sixty-sixes spinning count. Breeders, however, do not strive after a bigger average yield than this, recognising that it would be gained only by sacrificing carcass quality.

Quality in Pigs.

Talking of animal products and their importance in our export programme, we come to the point that in the building-up of the pig industry to supply the needs of the Motherland, and to confirm our name for quality on the British markets—and any other oversea market on which we may get a toe-hold—one of the most important things to do is to cull—cull consistently, and, if necessary, rigorously.

The voice of informed authority says there is no room for "scrubbers" in the pig industry. True enough; and there is only one place for animals that do not measure up to type and conformation standards, and that is the killing-pen. No matter what the breed of pig, the need for culling is urgent if quality of the product is to be maintained. That means, of course, that continuous and systematic grading of all pigs on the farm is essential if we are to ensure full growth and development, especially of the youngsters which should be kept in grazing paddocks.

As with most stock, there is a tendency when the demand is keen to ease up on culling; but no breeder, who has an eye to the future, can afford to neglect this fundamental, because the future of his own stud depends on the success of the stock he sells.

And here's another important point: It is possible when the war is over that there may be a strong demand for breeding stock as well as for high quality carcasses, and those who are likely to be in a position to supply that demand are the breeders who have stuck rigidly to selection and culling.

The Value of Bird Life.

In the South the gradual disappearance of useful bird life is causing serious concern to the powers that be. The Premier of New South Wales, for example, has expressed alarm at the lack of bird life in that State, and a good many thousands of people in the country districts feel the same way about it.

When creating wild life Nature achieved a true balance of the species, each with a particular purpose of its own, and kept in check by a natural enemy. Once this balance is destroyed no-one can adequately estimate the harm that is done. It is a well-known fact that the curse of insect pests to-day, especially in the pastoral industry, is causing enormous loss to primary producers. It is a sad fact that much of our native bird life is threatened with extinction, so much so that it is most important for the man on the land to take a personal interest in its welfare by preserving trees and other nesting places for insect-eating birds. Vandalism by indiscriminate shooting of birds cannot, of course, be too strongly condemned.

In Queensland, much has been done to preserve wild bird life by proclaiming sanctuaries all over the State. What are required are green timber belts and other natural cover for nesting places. Native bird protection should be a sound activity in every district throughout the State. If we measure up our recurring annual losses as direct results from our negligence and wanton destruction of insect-eating birds, we would get an idea of what they mean in terms of real money—money amounting to millions of pounds in the aggregate.

A New Agriculture in a New World.

That the end of the war will mean a new world in which Britain's policy should be based on agricultural expansion is the view expressed by agricultural authorities in Britain.

Butter from Whey.

The making of butter from whey was demonstrated in England recently. It is claimed that every 100 gallons of whey will yield 2 lb. of butter.

While the wisdom of saving this valuable fat is undeniable, especially in war-time, it suggests something wrong with a separator, or separating methods, which allows so much fat to remain in the skimmings.

Farming in Germany Under the Nazis.

The present German Government requires three fundamental requirements of the farmer—he must be Aryan in race, of German nationality, and of proved proficiency. There is no getting past any of these three points.

Every farmer is issued with a "hoffkarte" or farm card. It doesn't matter how small his acreage is, the farmer must have a card with room for at least four yearly returns. On this card all particulars are filled in, beginning with the name of the farm, its area, number of fields, description of crops. Everything has to be accounted for, even the vegetable garden and the fruit trees. Stock returns must show particulars of every animal and fowl and what they produce. The farmer is told just how much he is expected to produce. If in any way he falls short, a commission is on his doorstep to know the reason why. If the commission is not satisfied, then all activities are placed under control. He has to start exact bookkeeping, keep accounts daily and send them in monthly. Every three months he has to send in a balanced quarterly report, and every twelve months a report and balance-sheet for the whole year.

If there is no improvement after two or three years, the German farmer can expect to lose his farm without a penny compensation.

It has been said that the difference between national socialism and communism is that the communist takes away your cows, while the Nazis let you keep the cows but take the milk.

All this has meant a tremendous amount of organisation, including a survey of the productive capacity of 300,000 farms, reclamation of derelict land, the distribution of labour, and many other activities.

Grain Sorghum for Stock Feeding.

On parts of the Downs 1940 has been a great year for grain sorghum. On the Dawson and the Callide, and round about Monto and the South Burnett also, good crops have been bagged. Yields have been up to as high as fifty bushels and more to the acre.

Wherever conditions are too hard or too risky for maize, grain sorghums are recommended. Grain sorghum may be used as a substitute for, or in combination with maize and wheat in stock feeding. Many dairy farmers, pig, and poultry men are already using it with good results. And there is no doubt about its feeding value. Grain sorghum has nine-tenths the feeding value of maize, but, like all cereals, its protein content is deficient. That deficiency, however, can be made up with, say, cotton-seed meal, meat meal, or blood meal, if procurable. A bit of green lucerne or the addition of maize grain would help towards its completion as ration.

For pigs, grain sorghum should be crushed, if practicable, or fed as soaked grain. For fowls, grain sorghum may be used instead of wheat, but the change-over should be made gradually. It should be crushed for all-mash feeding—a mash which should contain 10 per cent. of lucerne meal. For dairy cows also, it should be crushed, but not too finely milled. Without green feed, it may cause paleness in cream, so it would be just as well, if seasonal conditions are not good, to add some maize meal to the crushed grain ration. For horses, grain sorghum should be crushed and the horses brought on to it gradually, otherwise there is risk of colic. For sheep, if plenty of rough feed is available, it would not be necessary to grind the grain sorghum, but in a dry time it should be fed to sheep in a milled form.

When a Cow is Most Profitable.

After a certain age has been reached by a cow—on the average, seven years—the food required for milk and butter-fat production increases, both in respect of dry matter and the digestible parts of the food. A good milking cow of exceptional strength, kept under favourable conditions, should continue to be a profitable producer until her twelfth year, although the economy of her production is apt to be somewhat reduced before this age is reached.

Nose Prints Foil the Dog Thief.

To foil dog thieves in America, a novel system of identifying stolen dogs has been devised by taking an impression of their nose prints—a variation of the finger-print system. The system is claimed to be infallible.

Give "Denis" His Due!

The pig has always been a despised animal. When we speak of an untidy house we call it a pig sty. "Fat as a pig" is a common expression, so is "dirty as a pig." Then if a fellow wails about anything we allude to him as "squealing like a pig." Call a man by any rude name you like, but never call him a swine, unless you're looking for real trouble. Speedsters we call road hogs; the obstinate fellow is pig-headed, and the glutton also is a hog. Flat beer we call pig swill. A bad-tempered horse is a "pig rooter."

Now, in spite of our contempt for "Denis," he is a very plucky animal—you'll find that out when hunting wild pigs. As animals go, he is docile, strong, and intelligent. Yet, we never hear anyone referred to as "game as a pig," or as quiet or as strong as a pig, or as cunning, although, for cunning, the pig could give a dog fox ten up and beat him.

Now that Danish bacon and pork is no longer on British breakfast tables, what "Denis" can do for the Queensland farmer becomes obvious, in view of the fact that the annual importation of pig meats from Denmark was valued at £20,000,000. We can breed pigs by the million if we like, and modern freezing methods make transport to the British market easy, subject, of course, to the availability of shipping space. We have the foundation stock for a big expansion in the pig industry. If we miss this chance through "pig-headedness," then we will be a pig-headed people, and there will be no sense in our "squealing like a pig."

A Cheap and Effective Dam.

In South Africa, a cheap and effective dam for stopping soil erosion in small creeks and gullies has been devised. It can be built at small cost with unskilled labour, and is especially useful where the bottoms of creeks are gravelly and where good-quality rock is not available for rough rubble masonry.

This is how the dam is built: A trench about a foot deep is dug in the bed of the creek from bank to bank, and a net made with No. 8 or No. 10 galvanised wire for placing across the trench. Stones are packed on the wire netting. The netting is then drawn around the stones, the ends of the wire being placed to hold the cylindrical mass of stones in position. The ends of the wire should be bound together on the upstream side of the wall and as near the foot of the roll of stones as possible. An earthen embankment will then prevent damage to the lacing during floods. The crest of the dam should be slightly lower in the centre than at the sides adjoining the creek banks, so that the water may flow over the middle of the dam. A "stone-in-wire" apron, at least a foot deep, should be constructed on the down-stream side of the wall to prevent erosion there.

Best Beef Crosses.

Results of a breeding experiment in Canada which enabled a practical comparison in beef production have attracted much interest among cattle men. Shorthorns, Aberdeen Angus, Herefords, and Galloways were used in the experimental crosses.

When the calves were fattened and slaughtered, the Shorthorn-Angus cross produced the highest average daily gain and the highest percentage of top-grade carcasses. Next in order were the Shorthorn-Hereford crosses. Some of the calves were slaughtered in Canada and some in England. Heifer calves, it was found, finished about thirty days earlier than steer calves. There was no difference in the fertility of the cows.

A Cure for "Wild Morning Glory."

American agricultural terms are, apparently, as bewildering and characteristic as American journalism itself. Here is an example: One paper tells about a machine which is charged with a chemical (carbon bisulphide) to kill "wild morning glory"—the *Glory* and the *Nothing* of a name, as Byron is alleged to have said.

This term "wild morning glory" leaves a doubt as to whether there is not some confusion between a "hang over" after the night before and a flat contradiction of the spirit of the song of a willy wagtail at break o' day. Actually, this American "wild morning glory" has no association with either, for, on reading a little further down, it is called a "bug pest." And this is a pity, for "morning glory," whether wild or otherwise, is much too good a name for a bug.

Oil Spoils the Fight in the Pig Pen.

Oil poured on troubled waters will calm the tempest, so will oil poured on troubled backs stop the fight in the pig pen.

Although every farmer may not realise the fact, heavy losses may result from the indiscriminate mixing of pigs in a pen. A strange pig cannot expect to put on weight when bullied and knocked about by the older inhabitants of the sty, and that happens when an outsider is placed among them. The stranger quickly loses condition, while the energy used up by the others in undue exertion also costs good money to replace as weight. Fighting, especially among the heavier pigs, often causes bruised pork unacceptable to the butcher.

An excellent way of preventing fighting when pigs from different litters are penned together for topping off is to smear sweet oil on their backs. They are soon so busy with the enjoyment of licking off the oil that they have no time to fight. The oil has the further effect of "smothering" the differences in smell that pigs detect at once.

Every fight means loss to the pig farmer, for the quicker a pig reaches marketable weight the more profitable it is. The man who makes most out of his pigs is the man who keeps his stock comfortable and contented. A pig may be spoiling for a fight, but oil will spoil the fight.

"Drowning" the Bulrush.

If there had been no bulrushes, there probably would have been no Moses. All the same, the bulrush is a pest known to mankind since pre-Biblical times; and it is a particularly serious pest in bore drains and irrigation channels. It stops the flow of water and causes silting, because of its dense habit of growth.

Methods of getting rid of it have proved very costly. The Council for Scientific and Industrial Research took the matter up. After trying sprays, soil poisoning, and cutting, success was eventually attained by a special cutting method. This method involves cutting the plant under water at intervals sufficient to prevent it ever reaching the surface of the water in irrigation channels. In that way the plant is "drowned" by having its air supply cut off. Once the channels are free, it is, of course, necessary to maintain a not very expensive patrol system to prevent plants growing on the edge of channels where they are difficult to "drown."

By continuing the cycle of cutting and patrolling channels from October to March each year since 1937, it has been possible to clear completely the worst infested 900 miles of the 2,000 miles of supply and drainage channels in the Murrumbidgee irrigation areas. As a consequence, the water distribution and drainage system is far more efficient than it was.

Liquid Manure Storage and Distribution.

Under the war-time cultivation scheme in Great Britain, all sorts of wrinkles and gadgets, many of them the outcome of new ideas, are being put into use. Officially, it has been pointed out that such a natural fertilizer as liquid manure is too valuable to waste, so that manure tanks and distributing carts are now in great demand. Much of the liquid manure produced on farms is allowed to go to waste, yet it is one of the finest of all top-dressings for quick-growing crops; it promotes an early bite of grass and is highly beneficial to arable land. Such a manure also is particularly rich in potash, a fertilizer not now so easily obtainable in artificial form as it was before the war.

Undiluted liquid manure is, of course, too strong for direct application; it should be mixed with about an equal volume of water. It is safer, too, to apply it in showery weather. It could be used far more frequently on a cultivation, particularly on bare land intended for leafy green crops, dilution being less necessary.

Under our conditions, this information would probably be of more use to farmers and market gardeners cultivating only small areas. Anyhow, it is a useful point to ponder over.

Shocking the Rabbit.

Talking of electric fences, and their value in making breaks for lambs feeding off rape crops, here is a new application of the idea: In the Hawkes Bay district in New Zealand electric fences are used to keep rabbits and hares out of the crops. It is well known that a lot of damage can be done to root crops by these pests. The new idea is to stretch two wires along the boundaries of a paddock at from 5 to 10 inches from the ground. This, it is said, will give all the protection from rabbits required and at a reasonable cost.

"Cash and Confidence."

One of the brighter sides of war is provided by the official bulletins of the British Ministry of Agriculture. Among the bright efforts, almost lyrical in expression, of farm advisers to get away from the stodginess of stern official "journalese," take this journalistic gem: "In stimulating the milk flow, nothing will take the place of fresh, green grass." Here is a drastic hint: "Shoot the pigeons and save the crops," otherwise entitled "Zero hour on the feathered front." This is almost as good as "The Lion hath wings," and it is wondered if the lion in question comes into the category of "the feathered front."

An "intensive attack is to be launched against the wood pigeon who must not (we are informed officially in anything but official language) be allowed to be one of the leading beneficiaries from the increased acreage we shall have under the plough this year."

Other entertaining contributions catch the eye. One comes under the heading of "cash and confidence." Then there is the reference to "animals that need no ration card"—just a little journalistic by-play on the topic of the day to stress the fact that sheep have no food fads and "of all our farm animals, they alone can face a long war without a ration card."

One does not look for laughs in official bulletins, but you do get real humour at times, even though it may be unconscious.

For the Farrowing Sow.

An unusually efficient type of farrowing pen that can be built in an afternoon at very little cost has been in continuous use on a New Zealand farm (as reported in *The New Zealand Farmer Weekly*) and has given complete satisfaction.

The pen consists of six posts arranged in the form of a rectangle. One end, facing due east, is left open and wire netting is strung round both the inside and outside of the posts. The space between the wire netting is thus the thickness of the posts. This space is stuffed with hay and when an iron roof is added the pen is complete.

In building such a cosy, draught-proof pen, it would be a wise precaution to dig a trench about a foot deep where the wire netting has to go. This prevents the sow from rooting underneath the straw walls. The mesh of the wire netting should, of course, be small so that the sow cannot pull the hay packing out. The floor of the pen should be about 18 inches higher at the back, so that it slopes sufficiently towards the front of the pen. This, of course, keeps the floor of the pen dry and comfortable.

When seen, the straw packing in three such farrowing shelters had not been touched for four years, except that from time to time a little more straw was thrust in at the top. An opening of a couple of inches was left all round between the hay packing and the roof to give plenty of ventilation.

The Clydesdale "Comes Back."

Down South the question of horse-power on the farm, whether it should be mechanical or animal, is engaging a lot of attention just now. Fuel costs, of course, is one of the important reasons why the Clydesdale may stage a "come-back," especially on the average-sized Australian farm.

Experiment farms are using horses, because it has been found they provide the cheapest power for field purposes. On large scale cultivations, the value of the tractor in comparison is, naturally, not disputed.

Getting down to tin tacks, when using tractors we have to think of every cost involved—cash instalments, replacement, spare parts, oil, fuel, and so forth—especially as they affect the enterprise of the smaller farmer.

The farmer who works horses usually breeds for replacements, makes practically no cash payments, and so is able to keep his financial commitments within revenue bounds. In war time, too, good money is kept in the country that would otherwise go overseas for both machine and fuel.

As a matter of fact, more than at any other time in the history of farming in Australia, it is now necessary to produce economically and hold in check any tendencies which inevitably move in the direction of higher production costs—hence the movement back to the yoking up of Darby and Dobbin for plough and other work on the average-sized farm.

Farm Notes

FEBRUARY.

A LATE sowing of sorghum will provide succulent fodder during the early winter months, or, if not required for immediate use, the crop may be conserved as silage or stover. The saccaline variety is favoured for this purpose, as it will withstand mild frosts, and continue to supply good feed well into the winter.

If additional green fodder is desired, there is still ample time to sow early maturing millets, Japanese millet, white panicum, or French millet; while buckwheat also is suitable, as it will ripen in eight to ten weeks.

In the cooler districts, a first sowing of oats, barley, or wheat for grazing may be made towards the end of the month, but elsewhere March sowings will be early enough.

February is regarded as the best month for planting the late or autumn potato crop, the acreage planted exceeding that of the spring or early crop because of the increased soil moisture usually available. Plant whole seed, preferably not less than 2 inches in diameter, and treat it with hot formalin or corrosive sublimate in accordance with recommendations issued by the Department of Agriculture and Stock. Farmers who are dissatisfied with their returns, and who do not regularly apply fertilizers, would be well advised to ascertain the increased yields usually resulting from their judicious use.

First sowings may be made of mangolds, swedes, field turnips, and other roots utilised for pig and cattle feed. Crops should be drilled in spaced rows so as to permit of cultivation between the rows, and the thinning of plants to suitable distances apart. Where only small areas are sown, the "Planet Junior" type of hand seeder will be found very useful. Because of the importance of increasing the area under lucerne, attention should be given to the adequate preparation of land reserved for late March-May sowings. The semi-permanent nature and value of a lucerne stand certainly warrant the best possible seed-bed, for once the crop is established only light surface cultivation can be given.

In the wheat areas, summer fallows will now be in fair condition, and with sheep to keep down weed growth, good tilth can be maintained by using rigid tyne cultivators, spring tooth cultivators, and harrows. Wheatgrowers generally are well aware of the importance of maintaining a good surface mulch.

Maize and other row crops will now be well advanced, so that any cultivation given should be as shallow as possible, consistent with the work of weed destruction.

The harvesting of a variety of crops will occupy much time as the season advances. Too much care cannot be given to the grading, bagging, baling, and generally attractive packing of all products placed on the open market, for inferior grades or poorly packed produce are rarely profitable.

SHEEP DIPPING.

The only known method to combat lice and ticks (ked) in sheep successfully is to dip. A preparation of proved efficiency should be used. If a powder dip is chosen, great care should be taken in the mixing. The powder in small proportions should be mixed with water and stirred until the consistency of an ordinary mustard mixture is attained. When the whole of the powder necessary to charge the bath is so mixed it may be added to the full quantity of water in the dip. This should be done overnight.

It is necessary to follow carefully the directions as to quantities given by the manufacturers. Sheep get most benefit from dipping when a month to six weeks off shears. Never dip sheep when they are hot or thirsty. For the job, avoid, if possible, extremes of heat and cold. Let the sheep drain thoroughly in the shade, if practicable. Treat the dipped sheep gently and avoid driving them for any considerable distance.

Orchard Notes

FEBRUARY.

THE COASTAL DISTRICTS.

FEBRUARY in coastal Queensland is frequently a wet month, with plant growth rampant. Where green cropping is not practised, it is not always possible to keep weed growth in check by cultivation.

The main crop of smooth-leaf pineapples will be ready for canning, and care should be taken to see that the fruit is sent to market with the least possible delay and in the best possible condition.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, every banana should be well-filled.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees which have recently been thinned out, and which must be removed. Citrus trees may be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees.

A few late grapes and mangoes will ripen during the month.

Strawberries may be planted towards the end of the month and, if early ripening fruit is desired, care should be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertilizer, for strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT SOUTHERN AND CENTRAL TABLELAND.

THE marketing of later varieties of peaches and plums and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Stanthorpe district, and the advice in these notes for the last two months on handling, grading, packing, and marketing is repeated with emphasis.

Extra trouble taken with fruit always pays. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market.

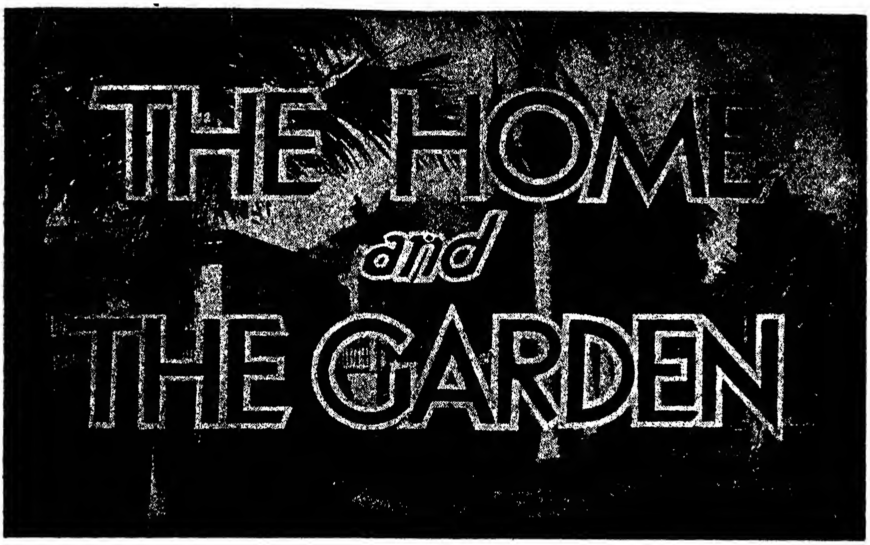
Early in the month it will be necessary to keep a careful watch on the crop of late apples for codling moth. If there is a slightest indication of attack, a further spraying will be necessary, as the fruit which has previously escaped injury usually suffers most.

Fruit fly also should be systematically fought whenever and wherever found, and no infested fruit should be allowed to lie on the ground.

Grapes will be ready for market, and the utmost care in handling and packing is necessary. Grapes should never be packed wet, and, if practicable, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and prevent their falling off.

In the western districts, winemaking will be in progress. Here, again, care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-quality wine.

Where necessary and practicable, citrus trees should be given a good irrigation, as this will carry on the fruit until maturity, provided the watering is followed up by systematic cultivation so as to retain sufficient moisture in the soil.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

CARE OF MOTHER AND CHILD.

FOUR COMMON ERRORS IN BABY MANAGEMENT.

Though fewer mistakes in baby management are made now than in the days before Maternal and Child Welfare Centres were established, there are mothers and nurses who still adopt methods which are likely to have a serious effect upon the health of the baby. Often mistakes are made in the earliest days of the infant's life and bad habits are begun which may be difficult to change.

Omitting to Put Baby to the Breast in the First Two Days.

Most babies when born know how to take their food from the breasts. Occasionally we find one who does not and he requires careful handling and management. If baby, who very often in these first days of life is very sleepy, is allowed to lie undisturbed he may, at the end of a day or two, be unwilling to work for his living. For that is what sucking is to a baby. There is no more difficult child to manage than one who has not learned to suck properly. Feeding him from a bottle having a teat with a hole so large that the fluid pours into his mouth without effort on his part will result in further disinclination to suck. Recently a mother was admitted into residence at the Welfare Centre with a baby aged three and a-half weeks who had refused the breast since birth. The reason for his admission was that, although he had been having large feeds from a bottle, he weighed less than he did at birth. The mother was disappointed because she had not been able to feed her baby naturally, and she was still anxious to do so. After much patience, perseverance, and work the nurses at the Welfare Centre succeeded in establishing natural feeding, and baby was sent home six weeks later completely breast-fed, having gained 41 oz.

Giving Artificial Food During the First Two Days.

An error which still persists is that of giving baby artificial food during the first two days of life. Although the mother's milk supply does not become established

until the third day, there is present in the breasts from birth a creamy-looking fluid which, though small in amount, is highly nutritious and contains substances which help to protect the baby against disease. This is the food which Nature has provided for the newborn child, whose digestive processes are beginning to function for the first time. If any other food were required during these early days, Nature would provide it. The practice of giving artificial milk mixtures, such as condensed milk or sweetened cow's milk, during the first week must be condemned. In the comparatively few cases in which, with proper management, the supply of natural milk is not established by the third day, the baby should continue to be put to the breasts regularly and the shortage supplied by giving what fluid can be expressed from the breasts with a little warm boiled water.

Thinking Mother's Milk "Does not Agree."

The reason why breast milk is best for baby is because it contains in the right proportions all the food materials necessary for the growth and development of the child and it can be readily digested. Mother's milk is always the right temperature and is free of germs. It is always ready and no troublesome preparation of utensils or of foods is necessary and it costs less. Mother's milk is the only perfect food for the baby. A mother should not believe that her milk "does not agree with her baby." If baby is upset it is usually due to mismanagement. Baby may not be getting enough. On the other hand, the mother may have an over-supply and baby may be getting the milk too quickly, or he may be taking too much, and his motions may become frequent and curdy. A mother should seek the advice of a Welfare nurse, either personally or by letter, and learn how to deal with these conditions.

Thinking a Binder is Necessary to Support Baby's Abdomen and Back.

The purpose of a binder is to keep the dressing on the navel in place until it heals. After this occurs it should be removed. Muscles, to grow strong, require to be allowed to move freely. Anything that restricts movement should be discarded.

You may obtain information on all matters concerning infant and child welfare by visiting the nearest Maternal and Child Welfare Centre (Baby Clinic), or by writing to the Sister in Charge, or by communicating direct with the Maternal and Child Welfare Centre, Alfred street, Fortitude Valley, N.1, Brisbane.

IN THE FARM KITCHEN.

FOR SUMMER MENUS.

Baked Savoury Fish.

Take fillets of any fish and place either whole or cut in half, according to size, in a fire-proof dish. Cover with a good white sauce and add a thick layer of grated cheese mixed with fine bread crumbs on top. Bake for 5 to 10 minutes (according to thickness of fish) in a hot oven, and finish under grill so that crumbs brown. A variation is to grease the dish and line with peeled and sliced tomatoes, and finish as before.

Creamy Rice.

Ingredients: 2 tablespoons well washed unpolished rice, ½ cup boiling water, 1 pint milk, 2 tablespoons sugar, 1 tablespoon of sultanas or chopped dates, 1 dessertspoon of butter or shredded suet free from skin.

Put rice in buttered pie dish. Cover with boiling water, and allow to stand in oven for 10 minutes or until water is absorbed. Pour milk over the rice. Stand 10 minutes longer. Add sultanas and sugar, place butter or suet on top. Put pie dish in slow oven, standing in baking dish containing water. Cook very slowly for about 2 hours till rice is thoroughly cooked, well swelled, and of a creamy consistency. Stir every 20 minutes. If after cooking for 1 hour rice is too thick, add a little more milk. Cook slowly for ½ hour to 1 hour to form crust. Do not stir in last ½ hour.

Caramel Rice and Bananas.

Make a creamy rice pudding using 2 tablespoons of brown sugar instead of white. When cooked and quite cold, slice 2 bananas, lay slices in lemon juice, arrange on top, and cover with a thin layer of whipped cream. Sprinkle with nuts.

Potato and Egg Savoury.

Hard-boiled eggs, boiled potatoes, white sauce, grated cheese.

Put a layer of sliced potatoes on the bottom of a buttered pie dish, cover with white sauce and grated cheese, add a layer of sliced hard-boiled eggs, and cover with sauce and cheese. Continue till dish is full. Sprinkle with bread crumbs and heat in oven.

To Cook Cabbage.

Wash cabbage well, including the green outer leaves. Tear into small pieces and place in saucepan with only the water left on the leaves after washing.

When almost cooked add a little butter, then pepper and salt to taste, and the boarding-house cabbage becomes a delicious vegetable.

Baked Potatoes.

Choose potatoes of uniform size. Wash well and brush till thoroughly clean. Dry and brush over with dripping. Bake in a hot oven. When cooked, make a small slit in each potato and press sideways so that the skin will split. Place a small lump of butter, a little salt, and a sprig of parsley in the opening.

Tomato Omelette.

Mince a medium-sized tomato with a little onion, add about 1 or 2 oz. butter, stir on the fire till the onion is cooked, then lightly beat 2 eggs and put into the saucepan, stirring all the time until eggs are nearly set. Serve on fried bread or buttered toast rounds.

Waldorf Salad.

Ingredients: 2 cups of diced apple, 1 cup diced celery, lettuce, 1 tablespoon lemon juice, ½ cup walnut (crushed), ¾ cup mayonnaise.

Add lemon juice to diced apple to prevent it from turning dark. Combine all ingredients, adding mayonnaise and mixing well with a fork. Salad of this sort should always be prepared in a very cold mixing bowl. Arrange lettuce leaves on individual plates and serve immediately. The mixture should have been previously chilled.

Salad Dressing: One-third cup of flour, 3 tablespoons butter, 1 cup hot water or milk, 3 egg yolks, 2 tablespoons lemon juice, 1 teaspoon of dry mustard, 1 teaspoon salt, 2 tablespoons sugar.

Salad Dressing: ⅓ cup of flour, 3 tablespoons butter, 1 cup hot water or mixture becomes quite thick, stir continually, put remaining ingredients in mixing bowl, and pour white sauce in and beat until all ingredients are combined thoroughly. Place in closed refrigerator jar and it will keep as long as desired.

Apples with Raisins.

Ingredients: 6 cooking apples, ½ cup seeded raisins, ½ cup stoned dates, ¼ cup brown sugar, teaspoon butter.

Mix raisins, dates, butter, and sugar well together. Remove core from apples and fill with mixture. Brush apples over with butter quite smoothly, then prick skins with a fork to prevent bursting. Place apples in a well-buttered pie dish. Add about 2 tablespoons of cold water. Put a small piece of butter on each apple, and bake in a moderate oven until tender.

Devilled Kidneys.

Required: As many sheeps' kidneys as persons to be served, some slices of bacon and some pieces of toast, 1 teaspoon chopped parsley.

Cut each kidney in half lengthways and roll in a slice of fat bacon. Sprinkle freely with cayenne, pack tightly together in small pie dish, scatter the parsley over, and bake for 20 minutes in a fast oven. Place 2 pieces on each piece of toast, and serve hot.

Milk Jelly.

Required: One pint of milk, 1 dessertspoon sugar, ½ oz. powdered gelatine, 6 drops vanilla essence.

Put milk, sugar, and vanilla into a bowl. Dissolve gelatine in ¼ cup of boiling water. Stir until cool, then mix carefully with milk. Pour into cold glass bowl to set.

Beetroot Mould.

Ingredients: 2 dessertspoons gelatine, 2 average-sized beets, 1 small lettuce, 1½ cups (¾ pint) hot water, ½ cup vinegar, pepper, salt, and sugar to taste.

Cook the beetroot till tender. Peel and cut into slices. Line a fluted mould with the slices, then fill centre with small dice-shaped pieces of beetroot. Dissolve the gelatine in hot water, add the vinegar, pepper, salt, and sugar. Pour over the beetroot, and allow to set. Garnish with shredded lettuce and sliced tomato. Serve with mayonnaise dressing.

Savoury Eggs.

Ingredients: 7 eggs, 1 tablespoon minced ham, 1 teaspoon parsley, ½ saltspoon salt, pepper, and ½ oz. butter.

Boil eggs hard and stand in cold water. When cold peel and cut in half lengthwise. Take out yolks and pound in a mortar with other ingredients. Fill whites with mixture, press sides together, rub with flour, egg, and bread crumbs, and fry nice brown. Serve hot.

Pineapple and Cheese Salad.

Ingredients: 1 small rough-skin pineapple, 2 or 3 oz. cream cheese, 2 tablespoons boiled dressing, savoury cream or mayonnaise, 3 gherkins, red pepper, lettuce leaves.

Peel, core, and slice pineapple.

Arrange crisp, green lettuce leaves on salad plate and place slices of pineapple in a ring with slices overlapping each other.

In the middle of each pineapple slice arrange a spoonful of cream cheese and sprinkle with red pepper. Heap in the centre of the salad the mayonnaise or cream mixed with chopped gherkin. Garnish with sliced gherkin.

If you have no cream cheese, grate up 2 oz. of matured cheese and moisten with cream.

Macaroni Cheese.

Boil ¼ lb. of macaroni till tender. Strain and return to saucepan. Add ½ pint of milk, 1 teaspoon of butter, 2 tablespoons of grated cheese, pepper, and salt to taste. Add 1 teaspoon of smoothly-mixed flour. Bring to the boil and place one-third in a greased pie dish. Sprinkle with grated cheese, add a thin layer of bread crumbs, and a slight seasoning of salt and pepper. Repeat in layers until dish is full or until all material is used up. Sprinkle the top with grated cheese and light-brown bread crumbs. Place small pieces of butter on top and heat through in a very moderate oven from 20 minutes to half an hour.

EVERY-DAY DISHES.

Left-Over Short-Cake.

Sift ¾ cup plain flour, 1 level teaspoon salt, 4 level teaspoons baking powder, and 1 tablespoon sugar together; add 1¼ level cups yellow cornmeal and mix well together. Beat 1 egg and add 1¼ cups milk and 4 level tablespoons melted butter. Form into a soft dough and spread mixture into a well-greased tin about 8 in. square. Bake in a hot oven for about thirty minutes. Split through the middle and fill with the following:—To 2 cups well-made white sauce add 2 cups diced cold meat, ¼ cup diced cooked carrots, ¼ cup cooked peas, the juice of 1 onion or grated onion will do, 1 teaspoon chopped parsley, 1 tablespoon chopped or shredded ham or cooked bacon, 1 dessertspoon lemon juice, and pepper and salt to taste. Simmer for five minutes to get thoroughly hot. Do not cook meat any longer, as it will toughen.

Salmon Mould.

In a double saucepan place ¾ cup milk and the yolks of 2 eggs, slightly beaten, 1 level teaspoon made mustard, pepper and salt to taste, and if liked, a dash of cayenne. Cook until mixture thickens, stirring all the time. Remove from the water and add 1 heaped tablespoon melted butter, the juice of 1 lemon or about 4 tablespoons, and 1 level tablespoon gelatine previously soaked in about ¼ cup cold water. Stir until well dissolved and allow mixture to cool a little. Add 1 large tin salmon, having removed bones and skin and broken up, taking care to keep it in flakes. Place in a mould and thoroughly chill. Turn out on to a flat dish and garnish with crisp lettuce and serve with a mayonnaise dressing to which has been added 3 tablespoons finely-chopped cucumber.

Baked Egg and Bacon.

Line a muffin tin with a rasher of bacon, drop in 1 or 2 eggs, sprinkle with salt and pepper, a little chopped parsley, and buttered breadcrumbs. Bake in hot oven until eggs are set.

Chocolate Trifle.

Make a boiled custard with ½ pint milk and 2 eggs and 1 tablespoon castor sugar. Flavour with vanilla. Line a glass dish with stale sponge fingers or sponge cake, sprinkle with sherry and a little of the custard. Add another layer of cake in the same way. Melt 4 oz. sweet chocolate and pour half of this over the second layer of custard, and now another layer of cake, &c., and lastly the remaining chocolate. Sprinkle thickly with chopped nuts and chill thoroughly. The custard must be poured on cake while hot, so it will soak well in.

Nut Croquettes with Crisp Bacon.

Mix 1 cup cooked and cold rice with ½ cup thick white sauce and ½ cup finely chopped peanuts. Add salt and pepper to taste and mix well together. Form into balls, roll in flour, then egg and breadcrumbs, and fry in boiling fat until a golden brown. Drain well and serve with or without crisp bacon.

Cheese and Pineapple Salad.

Cream ½ lb. Continental cheese well, add 1 tablespoon green capsicum and 1 tablespoon red, both finely chopped, 1 small tin crushed pineapple, ½ teaspoon made mustard, salt and pepper to taste, and if liked a little celery salt. Lastly add ½ cup mayonnaise and ½ cup whipped cream. Place in refrigerator tray and freeze or cover with salt and ice for two or three hours. Serve with cheese biscuits or water biscuits.

Date and Walnut Tart.

Place 2 cups milk in a double saucepan, add ½ cup brown sugar, and a good pinch salt. Mix 2 level tablespoons cornflour and 2 level tablespoons plain flour with a little cold milk until smooth, then add to milk, &c. Stir until mixture thickens, then add the beaten yolks of 2 eggs. Cook for 1 minute only to set the eggs. Now add 2 level tablespoons melted butter and stir until well mixed in. Now add 1 cup chopped dates, ½ cup chopped walnuts, and vanilla to taste. Allow to cool a little, then fold in the egg-whites, beaten to a stiff froth. Turn into a well-baked tartshell and decorate top with half walnuts. Melt ½ cup sugar in a saucepan, and when it becomes a rich brown add ¼ cup boiling water and stir until dissolved. Cool slightly, then pour over top. Chill well before serving.

ORANGE ALCOHOL.

We have known of the many uses of orange juice and of how nourishing it is, but a letter from a Digger in Palestine tells us of still another way of using up the surplus of the citrus crop. This is what our Digger friend says:—

> ''Production is now in full swing at a new citrus-alcohol factory which recently started operations. One of the main drinks made is 'Maski' (I don't know whether that name is Arabic or Hebrew, but I suppose it's a he brew, whatever the strength of the 'kick' it may have!). 'Maski,' which means 'My Drink,' is a new invention which is sure to interest citrus growers anyhow.''

The Palestine factory making it is working three eight-hour shifts daily. That suggests the A.I.F. over there is a definite business or, more correctly, a canteen prospect. The factory uses up about 30 tons of citrus fruits daily. The ''flesh'' remaining after the juice has been extracted is treated separately, and will be used as stock food.

Come to think of it, there are other possibilities. Power alcohol can be made from all sorts of vegetable material. Just imagine army transport run on orange juice! It would have this distinct advantage, both drivers and vehicles could ''fill up'' at army ''boozers'' (bowsers, rather)—a case of ''rejuicing'' and rejoicing, so to speak.

COCKROACH CONTROL.

Cockroaches are nocturnal, hiding during the day in dark corners and crevices, where they congregate in large numbers. In the house they usually hide near the sink and drainboard, behind the kitchen cabinet, and in similar places. If disturbed when foraging at night, they run rapidly for shelter, and a knowledge of where they conceal themselves is usually the key to their control.

In Queensland, houses are constantly being reinfested by adults crawling and flying in from outside, and no control measures can keep a building continuously free from the pest, if reinfestation is possible. Therefore, it is first necessary to clean up all outbuildings and burn accumulated rubbish of any kind. All cockroaches found hiding in packages of food and merchandise being brought into the house should be destroyed. They may be killed mechanically or by spraying with a proprietary fly spray. Crack fillers such as putty or plaster of paris, can be used effectively to close many openings used by cockroaches as avenues of escape to hiding places. This is particularly important if cockroaches are coming in from adjacent apartments through wall spaces or along the plumbing fittings.

Sodium fluoride is the best cockroach remedy for use in homes which have already become infested. If the powder is not readily available in pure form, suitable commercial preparations, generally known as insect powders, containing up to 80 per cent. sodium fluoride, can be obtained from any grocer. Sodium fluoride is poisonous to man if taken internally in sufficient amounts, and it should be kept away from food and away from children and pets. If used with reasonable care in cockroach control, however, no harm will follow. It may be sprinkled by hand along the back of shelving, draining boards, and other places frequented by the pests. When so placed in the runways the powder adheres to the limbs and is subsequently taken in through the mouth as the insect cleans itself. Sodium fluoride therefore acts as a stomach poison. The powder remains effective indefinitely in dry situations, but in very damp places it may cake and become useless.

Sodium fluoride is best applied with a small duster or bellows, and blown into the hiding places. In this way more cockroaches are directly affected, for they die rapidly when the powder is blown directly on them. The application should be made in the evening and the powder left for two or three days. Frequent treatments are usually necessary at intervals of one or two weeks if the pest is to be kept under control.

LEVEL WITH A SQUARE.

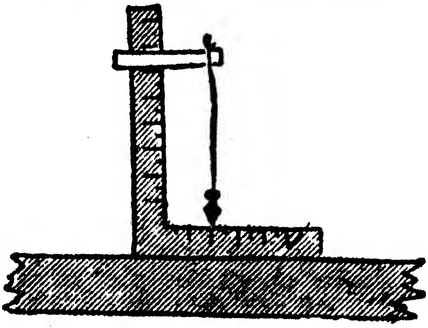


Plate 22.

To level with a square, fasten a clamp to the vertical arm of square and attach a plumb bob to the clamp. When the distance between the string and the vertical arm is equal top and bottom, the surface upon which the lower arm of the square rests is level. This bit of knowledge may help sometime when the level is broken.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1940 AND 1939, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of years' records.	Nov., 1940.	Nov., 1939.
North Coast.	In.		In.	In.
Atherton	2·67	39	1·68	5·59
Cairns	3·87	58	1·85	3·53
Cardwell	4·17	68	3·62	4·97
Cooktown ..	2·49	64	0·28	0·56
Herberton ..	2·65	54	4·12	4·35
Ingham	3·80	48	2·84	1·93
Innisfail	6·35	59	3·28	5·55
Mossman Mill ..	4·77	27	7·19	10·16
Townsville ..	2·56	23	0·52	1·43
Central Coast.				
Ayr	1·73	53	..	0·52
Bowen	1·28	69	0·38	2·61
Charters Towers ..	1·43	58	1·40	0·18
Mackay P.O. ..	3·07	69	0·51	1·59
Mackay Sugar Experiment Station	2·81	43	0·91	1·33
Proserpine ..	2·85	37	2·44	0·69
St. Lawrence ..	2·40	69	2·21	2·34
South Coast.				
Biggenden ..	2·86	41	5·86	4·49
Bundaberg ..	2·79	57	2·03	5·41
Brisbane	3·77	88	4·66	2·54
Caboolture ..	3·65	53	5·47	4·18
Childers	2·86	45	3·04	5·25
Crohamhurst ..	4·61	47	5·59	3·02
Esk	3·29	53	4·69	2·41
South Coast—contd.	In.		In.	In.
Gatton College ..	2·90	41	3·34	3·54
Gayndah	3·01	69	2·42	3·41
Gympie	3·30	70	8·64	3·27
Kilkivan	2·65	61	6·16	·43
Maryborough ..	3·23	69	4·20	2·83
Nambour	4·27	44	4·[illegible]9	4·09
Nanango	2·82	58	7·62	2·48
Rockhampton ..	2·49	69	3·22	4·66
Woodford ..	3·28	53	5·01	2·07
Central Highlands.				
Clermont ..	2·07	69	3·83	1·94
Gindie	2·21	41	..	1·39
Springsure ..	2·32	71	1·84	2·78
Darling Downs.				
Dalby	2·89	70	2·63	2·05
Emu Vale ..	2·79	44	4·17	2·97
Hermitage ..	2·58	33	..	..
Jimbour	2·61	52	2·74	2·00
Miles	2·63	55	1·99	0·87
Stanthorpe ..	2·73	67	2·20	1·74
Toowoomba ..	3·35	68	3·84	3·93
Warwick	2·65	75	4·35	2·26
Maranoa.				
Bungeworgorai ..	2·18	26	0·34	0·82
Roma	2·16	66	0·69	1·58

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—NOVEMBER, 1940.

COMPILED FROM TELEGRAPHIC REPORTS.

Divisions and Stations.	Mean Atmospheric Pressure. at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	..	87	76	90	14, 20, 25	72	24	28	2
Herberton	..	84	61	91	7	49	17	412	8
Rockhampton	29·92	93	70	102	2	62	16, 17	322	6
Brisbane	29·94	84	66	97	9	59	17	466	8
Darling Downs.									
Dalby	..	89	60	97	1	46	7	263	9
Stanthorpe	..	81	52	92	12	35	6, 7	220	10
Toowoomba	..	82	58	91	1	48	17	384	10
Mid-Interior.									
Georgetown	29·87	97	71	107	2, 3	58	18	273	6
Longreach	29·88	98	67	107	8	53	16	35	2
Mitchell	29·90	91	61	102	8	45	7	116	..
Western.									
Burketown	..	97	75	105	6	64	17	145	4
Boulia	29·87	96	69	107	7, 11	60	18	30	3
Thargomindah ..	29·91	91	64	104	20	56	3, 7, 17	..	..

ASTRONOMICAL DATA FOR QUEENSLAND

FEBRUARY, 1941

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON. AT WARWICK.

Feb.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
			a.m.	p.m.
1	5.24	6.46	9.25	9.37
2	5.25	6.46	10.17	10.12
3	5.26	6.45	11.8	10.48
4	5.27	6.45	11.59	11.25
			p.m.	
5	5.28	6.45	12.50	nil
				a.m.
6	5.29	6.44	1.42	12.4
7	5.29	6.43	2.34	12.50
8	5.30	6.42	3.26	1.38
9	5.31	6.42	4.18	2.29
10	5.32	6.42	5.7	3.26
11	5.33	6.41	5.55	4.25
12	5.33	6.40	6.40	5.26
13	5.34	6.39	7.25	6.29
14	5.35	6.39	8.8	7.32
15	5.36	6.38	8.52	8.36
16	5.36	6.37	9.36	9.40
17	5.37	6.36	10.22	10.43
18	5.37	6.34	11.10	11.46
				p.m.
19	5.38	6.33	nil	12.47
			a.m.	
20	5.38	6.32	12.1	1.46
21	5.39	6.32	12.53	2.41
22	5.40	6.31	1.49	3.33
23	5.40	6.30	2.45	4.21
24	5.41	6.29	3.41	5.6
25	5.42	6.28	4.37	5.46
26	5.43	6.27	5.32	6.24
27	5.43	6.26	6.25	7.0
28	5.44	6.25	7.18	7.36

Phases of the Moon.

4th Feb., First Quarter, 9.42 p.m.
12th „ Full Moon, 10.26 a.m.
19th „ Last Quarter, 4.7 a.m.
26th „ New Moon, 1.2 p.m.

IN THE HIGH HEAVENS.

NEAR the beginning of last month the earth was at her nearest to the sun, a distance of 91,350,000 miles separating us from the great power station, which energises the whole earth. Since then we have moved on our way some 50,000,000 miles and, of course, new sky-scapes have come into view. Most of the starry constellations we saw a month ago are still in our night sky but they rise about two hours earlier and new stars appear below them, which, in turn, will pass across our sky, as the earth moves onward, through the heavens round the sun.

At the beginning of this month, between 8 and 9 o'clock, the finest group of constellations ever seen from planet earth will be in the northern sky in the meridian; that imaginary line through the sky which stretches from north to south and above the observer's head. The centre of this starry group is the famous constellation of Orion, the giant hunter. In very early times, even before the dawn of history, men associated certain star groups with the figures of men and animals, perhaps national heroes or historic narratives which could be seen and so remembered by people however scattered. Some think that Orion is the starry effigy of Nimrod, the mighty hunter, mentioned in the early part of the book of Genesis. The Giant's belt of three equally spaced stars, and his sword hanging therefrom, is well known. Above the belt to the northward are two bright stars which mark his shoulders, and two others mark his legs. Around Orion is a group of, what seems to be, associated constellations, their purport known only to those who devised them probably 5,000 years ago. Behind Orion, to the eastward, are his two dogs, Canis Major and, across the Milky Way, Canis Minor, in which are the Dog Stars, Sirius and Procyon. In front of the Giant is the Bull, Taurus, which appears to be charging him. In the head of Taurus is a large, V-shaped cluster of stars, called the Hyades, the chief star of which is Aldebaran, a ruddy star. A little farther to the westward is the well known cluster of the Pleiades or the Seven Sisters. These are in the shoulder of the Bull. Some distance north of Orion, across the Milky Way, is the very bright star, Capella. A line from Sirius to Procyon and continued brings us to two bright stars in the constellation of Gemini, called Castor and Pollux, named after two Roman gods who were patrons of sailors. The ship in which St. Paul sailed from Malta to Rome was called Castor and Pollux. Whatever was the origin of the names and groupings of the forty-eight ancient constellations it has now only an antique value. In spite of attempted alterations the ancient names still persist.

Jupiter and Saturn, the evolutions of which we have watched for so many months, are now declining toward the west at dark. They have been moving together again since 20th December. On 26th February they will be in conjunction for the third and last time, thus ends the rare triple conjunction of these two planets which will have kept them together for eight months. The last triple conjunction of Jupiter and Saturn occurred in 1683.

In early February, the sky, before daybreak, is very beautiful with brilliant stars and constellations. Venus lends her charm low in the east among the stars of Saggittarius, the Archer. A little higher the starry curves of the Scorpion will be seen. Almost in the meridian is the large white star, Spica, in the Virgin, from which the reddish star Arcturus is found toward the north-east. Farther along the zodiac and declining to the west Leo is very conspicuous, with the well known Sickle which forms his forepart.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.

Vol LV. 1 FEBRUARY, 1941 Part 2

Event and Comment

Expansion of the Tobacco Industry.

THERE was big scope for the expansion of the Australian tobacco-growing industry, and that expansion would take place if the economies of the industry were properly adjusted, said the Minister for Agriculture (Mr. Frank W. Bulcock) in the course of a recent announcement.

He was commenting on plans for the extension of tobacco production and the co-operation of the States with the Commonwealth in applying them.

Mr. Bulcock said that the Mareeba and Dimbulah districts of Queensland could grow tobacco which, of its class, was equal to any produced in the world. Tobacco production, equally with the production of other crops, depended on the return obtained by the grower. Tobacco growing had not made the maximum possible expansion in Australia because the fiscal policy had not favoured the grower. In recent years there had been some expansion, as the grower had acquired more knowledge of the processes of the culture and curing of a satisfactory leaf.

New Remedy for Worms in Sheep.

A LIMITED supply of phenothiazine will be available shortly for the treatment of worms in sheep.

This chemical in exhaustive scientific tests has proved effective against all except tape worms, but at the moment greatest importance is attached to its capacity to expel the nodule worm.

Another interesting feature of the discovery is its effectiveness against the so-called red worm in horses. Its great advantage in this respect is that it can be given in the feed.

In a recent statement the Minister for Agriculture and Stock (Mr. Frank W. Bulcock) pointed out that hitherto stocks of phenothiazine in Australia have been sufficient only for experimental purposes. Because of the war it has been extremely difficult to obtain supplies. Recently, however, a small consignment had been received, part of which will be made available in the near future to stockowners in this State.

Trees and Soil Conservation.

WHILE the planting of trees would assist in solving the problem of soil erosion, a more important preventive measure in Australia at present was that trees should not be destroyed, said the Minister for Agriculture and Stock (Mr. Frank W. Bulcock) in the course of a recent statement on rural problems.

The Minister was commenting on the cabled report that the planting of millions of trees in the "dust bowl" area of the United States had led to the reclamation of many farms. He said that the subject had been closely considered by his Department, and that only recently a Queensland officer had visited New South Wales to make a survey of the soil conservation methods adopted by the Bureau of Soil Conservation there.

The problem of soil drift was acute in some parts of Australia, said the Minister. In places, the central desert had extended, causing ruin to good pasture and grazing land. Trees served two purposes. They held the soil and protected it from the wind. Only trees that were of no use, or otherwise undesirable, should be removed. Indiscriminate ringbarking should be avoided, for ringbarking might, in some cases, create the conditions which had ruled in the American "dust bowl." There, it had cost the United States Department of Agriculture and individual States many millions of dollars to restore to productivity land which had been ruined by the destruction of trees or by misuse.

Erosion by wind force, which had had so serious an effect in the American "dust bowl" area, could be checked by trees, hence the need for their conservation.

Farming of the Future.

SOME remarkable developments are arising out of the war which must, in one way or another, have a profound influence on the future of agriculture in Australia, as well as elsewhere. The war, for instance, has led to an improvement in methods of industrial output, as well as to the discovery and use of new sources of power and energy.

Much of present-day research will have no real economic application when the war is over, but many of the discoveries now being made will be of considerable benefit when peace returns. We in Australia are, fortunately, far away enough from the actual scenes of conflict to have time for studying closely what the future world demand for primary products are likely to be. For example, after the war there is sure to be a heavy demand for wool and livestock in Europe, especially in the countries exploited so disastrously for their people by a ruthless invader. Besides food and clothing, the demand on the primary industries is

growing enormously for the raw materials of new manufacturing industries. Farming is becoming, therefore, not only a matter of scientific practice but also of scientific planning in association and in consultation with the other major industries of the Commonwealth, while our Governments are wisely giving close attention to world trends, both in industry and in agriculture.

New Uses for Maize.

OF especial interest to Queensland maizegrowers is the news that the United States Department of Agriculture is about to open a laboratory for the study of maize as an aid to industry associated with national defence. This will really be an extension of the work of investigation into the many industrial uses to which maize can be put, apart altogether from its uses as food for man and beast. It is proposed to explore the possibilities of maize as a base for synthetic rubber, plastics, fibres, and motor fuel. Last year yarn, buttons, poker chips, and laminated boards made from a maize by-product were exhibited at the National Farm Chemurgic Conference, hence the possibilities sought by the research workers are not so very remote.

The by-product from which the articles mentioned are manufactured is a protein called zein, which constitutes about 10 per cent. of the whole maize. Its most practical use at present is for coating paper. It is oil and grease proof. Zein films are tasteless, odourless, and non-toxic, hence they are useful for food containers. Another use is in solid-colour printing using aniline dyes. It is claimed that by using zein, fugitive dyes can be made more light-resistant; and that bleeding dyes can be made more resistant to water. In a clear state, zein can be formulated to carry bronze and aluminium powders. It also is made into a plaster which can be moulded in combination with other resins. It has several other industrial uses which suggest the immense possibilities of a crop which is now so largely used as a food for farm animals.

The results of the research work now in progress will be awaited with interest, especially by those who foresee the effect these new developments must have on the future of our primary industries.

Back to the Horse.

WITH war conditions necessitating the rationing of imported oil and petrol, and the introduction of more economical methods in the farming industries, there has been a marked swing back to the horse, especially in the Southern States.

Prospects for the horse-breeder have been materially brightened by recognition of the national importance of the horse, and of the obligation to the breeders who are now straining every resource to maintain their stud establishments at a high standard. This encouragement is warmly welcomed by breeders of Clydesdales and other utility horses. It not only enables them to plan ahead and build up for the future, but it will place the horse-breeding industry in Australia on a much sounder footing than it has been since the tractor began to push the horse out of its regular farm job.

Growing interest in heavy farm horses, the Clydesdale particularly, has been reflected by increased sales by horse-breeders and bigger entries in country shows for the utility horse classes. The horse is by no means a back number.

The Soils of the Nambour, Woombye, and Palmwoods Districts and their Suitability for Pineapple Culture.*

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THE soils of the Nambour, Woombye, and Palmwoods districts vary considerably in their suitability for pineapple culture because of fundamental differences in their physical and chemical characteristics. A series of soil investigations has been carried out in order to determine the nature of these differences. The various soils were first classified, the unit of classification being the "soil type." Each soil type was then examined in order to gain a knowledge of (*a*) its capacity to supply moisture to growing crops, (*b*) the conditions of aeration and drainage which exist in it, and (*c*) the amount of plant foods it contains.

In the area surveyed, two main soil groups occur, each of which is composed of a number of soil types. The two groups are distinguished primarily by the colour of the surface, sub-surface, and subsoil layers. Since this colour difference is an indication of physical and chemical changes, it provides a convenient means of identification. The soils are described as follows:—

Group 1.—The soils of this group are dark brown to reddish brown on the surface. The reddish tinge increases with depth, and this intensification in colour is a definite characteristic of the subsoil. These soils usually occur on the long, more or less unbroken ridges near the township of Woombye, which extend generally southwards to Palmwoods.

Group 2.—This group of soils is much lighter in colour than those described above. The colour of the surface layer is greyish brown, and it is usually shallow and overlies a yellowish brown subsoil. This yellowish colour contrasts very sharply with the reddish nature of the subsoils of Group 1.

DEFINITION OF SOIL TYPE.

In order to recognise any particular soil type, it is necessary to consider the surface, sub-surface, and subsoil layers as one complete unit. The surface layer, or as it is more commonly called, the "surface horizon," is that portion of the topmost soil, which, because of its relatively high organic matter content, is somewhat darker in colour than the soil immediately underlying it. The "sub-surface horizon," as the name indicates, occurs directly below the surface horizon to which it is similar in texture. However, it is lighter in colour since there is a decrease in the amount of organic matter present. The "subsoil" underlies the sub-surface layer. It differs from the surface and sub-surface in that it contains practically no organic matter, and the percentage of clay is much higher. The increased amount of clay in the subsoil is due to the removal of the finer particles from the surface and sub-surface horizons by water percolating downwards, and

* The second of a series of soil surveys covering the major pineapple-producing areas in southern Queensland has been completed. The work was carried out in the Nambour, Woombye, and Palmwoods districts, and a report on the data obtained was published in the August and September, 1940, issues of this Journal. As this report was necessarily technical in nature, it has been considered advisable to present separately a short non-technical discussion of the soils concerned, with particular reference to the practical aspects of pineapple culture in the districts surveyed.

its subsequent deposition at the lower levels. The nature of these three horizons and the various depths at which they occur define the soil type.

Although the roots of the pineapple plant are confined chiefly to the surface and sub-surface horizons, it is not possible to determine the suitability for pineapple culture of any soil type by an examination of these two layers alone. The conditions of moisture availability, aeration, and drainage occurring in the root zone is of utmost importance to the health of the plant. While these conditions are inherent properties of the surface and sub-surface layers themselves, they are influenced to a large extent by the nature of the subsoil, and the depth at which it occurs. For instance, underneath a sandy surface horizon, which is open and porous, a tight, clayey subsoil almost impermeable to water,

Plate 23.

Shallow Phase of Palmwoods Sand.—The formation of large, compact clods in the dry, upper portions of the subsoil indicates the clayey nature of this zone.

may occur, even at a shallow depth. (Plate 23.) During prolonged wet periods the porous surface material may suffer from temporary water logging, since the excess moisture cannot drain away from the root zone, owing to the relatively impervious subsoil. This condition will be aggravated if run-off water is received from higher slopes.

During the survey of the Nambour, Woombye, and Palmwoods districts, it was found that a considerable variation occurred in the characteristics of the surface, sub-surface, and subsoil horizons of the various soil types. Before describing these variations it may be advisable to define the meanings of some of the terms used in the descriptions.

SOIL TEXTURE.

Soil texture is an important characteristic which may readily be determined in the field. Various terms are used to describe the texture of a soil. The most commonly used terms are: sand, sandy loam, loam,

sandy clay loam, clay, clay loam, and sandy clay. Since a soil is a mixture of particles whose sizes range from relatively coarse material (sand) to very fine material (clay), its texture will depend on whether the coarse or fine particles predominate. A sandy soil or sandy loam will contain a high proportion of sand in preference to clay, while a loam or a clay soil is characterised by a much larger proportion of clay. The determination of the texture of a soil or subsoil should always be carried out on a moistened sample. Conclusions made from the examination of a dry soil are often misleading, e.g., unless the sample is wetted, a clay which is slightly granular in appearance may be mistaken for a sandy soil. The following procedure is recommended for determining texture:—Soil held in one hand is slowly moistened with water and the water is added cautiously until the soil is quite wet, but not sloppy. The soil is then kneaded with the fingers of the other hand. If free water oozes from the soil after it has been well kneaded, too much water has been added. This may be remedied by the addition of a little more soil. The "feel" of the soil is noted during the kneading process. The texture can now be determined since the various textures will impart the following characteristics to the moistened soil:—

Sand.—A soil which may be classified as a sand will be loose and incoherent. It will not stick or bind at any moisture content. If the wet sample is squeezed between the fingers the individual sand grains can be felt, and it will be evident that a large number of them are present. There is no plasticity and the soil cannot be moulded. With a further addition of water the mass will fall apart.

Sandy Loam.—A soil possessing this texture is slightly more coherent when moist than a sand. It shows a very slight degree of plasticity, and, therefore, when it is squeezed in the hand it will mould itself into a lump. However, this is loose and friable and falls apart readily. A large number of sand grains are present. There is no trace of stickiness.

Loam.—In this texture class, the proportions of sand and clay present are such that neither of these two constituents predominantly influences the "feel" of the moist sample. The "loaminess" is readily recognised since the sample does not feel sandy, nor is there any suggestion of stickiness. When the sample is kneaded it becomes definitely plastic and may be moulded into blocks or cubes. These are porous, and under slight pressure break readily with the formation of large cracks. The moist soil may be rolled into a rope-like form between the palms of the hands. This is not flexible and breaks with slight bending.

Sandy Clay Loam.—The features which distinguish this texture class from a normal loam are the presence of sand particles, which can be felt in the moist sample, together with a stickiness imparted by an increased clay content. It is most aptly described as a sticky sandy loam.

Clay.—A clay soil will absorb a considerable amount of water. When wet it is noticeably sticky and exhibits a high degree of plasticity. It may be moulded into numerous shapes. Pressure on these moulded forms produces indentations, or a change of shape, rather than a disruption of the mass. It may be rolled into long threads the ends of which may be joined to form a ring.

Clay Loam.—As the name indicates, a wet soil of this texture will a "feel" which is intermediate between that of loam and clay. A loamy tendency is apparent but a definite stickiness is also noticeable. It is possible to roll it into long threads, the ends of which may be joined with little difficulty.

Sandy Clay.—This has a high clay content and therefore possesses almost the same degree of plasticity and stickiness as a clay soil. It contains, however, a noticeable proportion of sand, which can be felt when the moist sample is rubbed between the finger and thumb. Usually, it is composed of sand and clay with only a small proportion of particles whose sizes are intermediate between these two extremes. The organic matter content is generally low, and a sandy clay texture occurs most commonly in subsoils.

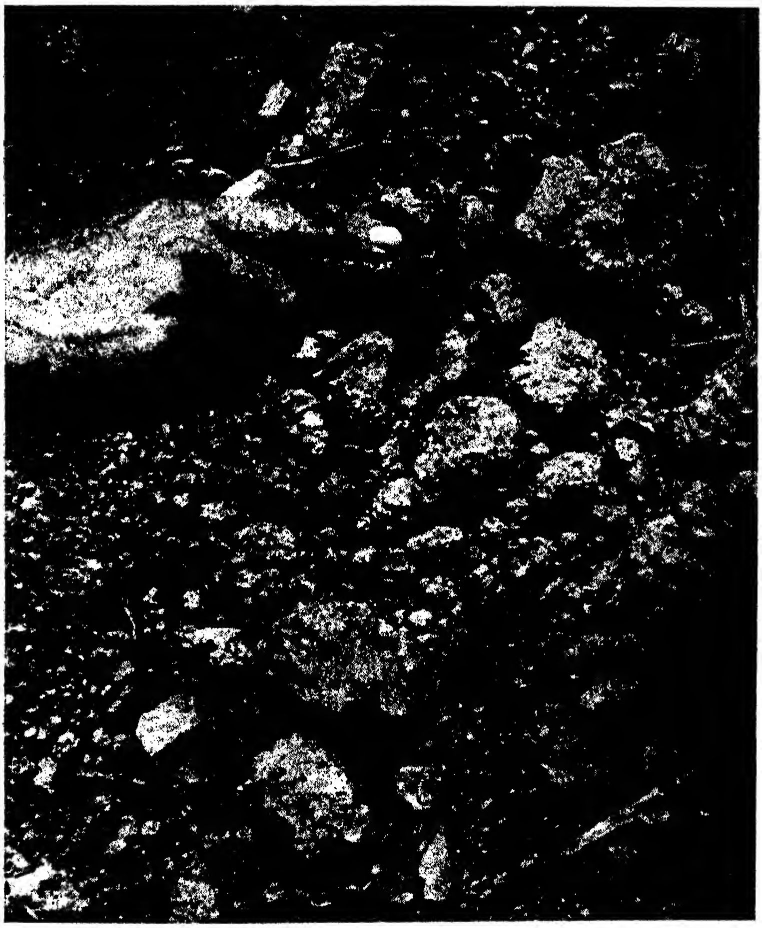


Plate 24.

CLODDY STRUCTURE.—The formation of these large, hard clods is typical of a soil which is low in organic matter and contains a relatively high percentage of clay. In the Nambour, Woombye, and Palmwoods districts a persistent cloddy state indicates a soil less suitable for pineapple culture than one in which a crumb structure is present.

SOIL STRUCTURE.

The term "structure" as applied to the soil is often confused with texture. It is, however, an entirely different property. The texture is seldom apparent to the eye, but is recognised most conveniently by the sense of *touch*. Structure, however, can be *seen*, since it is the state reached when the small particles of the soil form visible aggregates. Cloddiness is a definite form of structure. Although texture and structure are separate properties, the structure of a soil is often dependent upon its textural characteristics, and certain textures often give rise to characteristic structures. In general, it will be found that the lumps or clods become larger and more compact as the clay content increases.

The soil organic matter also plays an important part in the formation of structure. Its chief function is to reduce the size of the clods by rendering them porous and friable. In this state they readily break down into a loose mass of small soft "crumbs," about one-quarter inch in diameter. Such a soil is readily permeable to water, has a high moisture supplying power, and is well aerated. It is particularly suitable for pineapple culture. A "nutty" structure is one in which the aggregates are ½ to 2 inches in diameter. When the soil lumps are 4 to 10 inches wide the structure is termed "cloddy." In the Nambour, Woombye, and Palmwoods districts, a persistent cloddy state usually indicates a less suitable soil for pineapple culture than one in which a crumb structure is present, since it implies a low organic matter content in conjunction with a relatively high percentage of clay. (Plate 24.)

In the loams and clay loams of the area, the presence of a favourable soil structure is essential, for its presence means that there is a satisfactory system of passages between the soil aggregates or lumps thus allowing the free entry of air and the removal of excess moisture. This greatly improves the drainage of the heavier surface soils. Moreover, since the rate of penetration is increased, there is less loss of water by surface run-off. Consequently, not only is erosion decreased, but the replenishment of the moisture content of the sub-surface and subsoil layers is facilitated.

Structural aggregates do not form in the sands and sandy loams. However, water movement is not restricted in these, since the high percentage of sand present maintains a loose and porous condition in the soil.

SOIL TYPES OCCURRING IN THE AREA.

From an agricultural point of view the soil types which are most commonly used for pineapple production in the Nambour-Woombye-Palmwoods area may be conveniently discussed by grouping them according to the texture of their surface horizons.

The Loams.

Throughout the area there is a widespread distribution of soils whose surface horizons are typically loam in texture. Because of this and other similarities in their sub-surface and subsoil horizons, these soils form a definite soil type, which has been termed the Woombye loam. It occurs about the township of Woombye, and extends generally towards Palmwoods and Diddillibah. In general, it is developed on the long, gentle and frequently unbroken ridges which occur in these areas.

The Woombye loam is readily recognised by its dark brown to dark reddish brown colour, and the loam texture of its surface and sub-surface horizons; this texture persists without appreciable change to a depth of 12 inches. At this depth, the texture becomes noticeably heavier and may be classed as clay loam, the colour of which is red to reddish brown. The subsoil, which occurs at a depth of about 20 inches, is also typically reddish in colour. Its texture, however, is moderately heavy, and is described as clay.

A well-developed crumb structure is usually present in the surface horizon, and this provides a favourable environment for the root development of the pineapple plant. The sub-surface and subsoil horizons are well drained, provided there is sufficient slope to ensure the removal of excess surface water. However, the favourable structural condition of the surface soil depends largely upon the amount of soil organic matter present. In the virgin state there is a good supply of humus, but in many instances this has depreciated with continued cultivation. Consequent upon this loss, there is a deterioration of the originally favourable structure. The soil becomes a mass of very fine particles and, when dry, is dust-like in appearance. On wetting, the individual particles swell, resulting in a tightly packed soil. Excess water will not drain away and, therefore, the access of air to the roots is decreased. Because the pineapple plant is sensitive to any decrease in the supply of oxygen to its rooting system, such a soil condition adversely affects its growth during prolonged periods of wet weather. Furthermore, since the penetration of moisture is slow, much of the water from sudden storms will be lost in the run-off. During the spring and early summer, when conditions are normally dry, the maintenance of a supply of available soil moisture is largely dependent upon storm rains; but, if the surface layer does not readily permit the penetration of these rains, the sub-surface and subsoil horizons will remain dry during this part of the growing period.

Because the ability of the Woombye loam to withstand very wet or very dry conditions is largely determined by its structural features, it is essential to maintain its organic matter content as close as possible to the original level. Cover crops are helpful, but the most effective way of replenishing the organic matter content of pineapple land before replanting is by returning the whole of the old pineapple plants to the soil. The practical difficulties this presents are being largely overcome by the use of the tractor-powered rotary hoe. The benefit resulting from this is twofold; in addition to maintaining the humus content at a satisfactory level, large quantities of nitrogen, phosphoric acid and potash, contained in the old plants, are conserved.

When the Woombye loam is being prepared for pineapples, it should be ploughed as deeply as possible. This will open up the sub-surface horizon, thereby improving the percolation of water through this layer. Unless erosion has occurred, the clay subsoil is well below plough depth and there is little danger of mixing this unsuitable material with the upper layers. The use of a rotary hoe should be avoided when the sub-surface is in a moderately sticky or plastic state, otherwise a compacted layer is formed immediately below the disturbed soil. Trampling during harvesting and other operations cannot be avoided, but the effect of this is not serious when the Woombye loam is

in a favourable structural condition. However, if the soil has been reduced to a dust-like state by excessive cultivation and loss of organic matter, the surface will soon become tight and compact. In ratoon crops growing on soil of this type, it is a good practice to open up a double furrow down the middle of the inter-row space in the winter. While this has a beneficial effect on drainage generally, it also permits the development of new roots from higher up the parent stem since the depth of the root zone is increased by the soil which is thrown up against the base of the plant. The root damage which is caused by plouhing such a furrow at this time of the year is negligible.

The Woombye loam has a higher wilting point than the sands and sandy loams of the district, that is, it must contain considerably more moisture before the water is available for plant growth. For this reason it is important that the soil should be maintained in a condition in which it can make efficient use of the characteristically intermittent rainfall of the Nambour-Woombye-Palmwoods area. The storage of water in the surface and sub-surface horizons depends upon the permeability of these layers. As a means of reducing moisture loss by evaporation, mulching of the surface soil is recommended on old land. Peanut shells, sawdust, and paper mulch are excellent for this purpose. If paper mulch is used, it should not be laid down on a dry soil. The paper is waterproof; therefore the dry soil under the paper can receive its water only from the soil which has been wetted outside the paper. The lateral movement of moisture in the Woombye loam is very slow, and tests have shown that the dry soil under the paper will remain in this state for some considerable time. An additional benefit derived from the use of mulch is that it prohibits the beating down effect of the rain on the soil of the plant rows. This is particularly important during the early stages of growth, since the pineapple plant does not produce an adequate cover for the soil until eight or nine months after planting. The use of surface mulches on the Woombye loam also serves to maintain a loose and friable and, consequently, well-aerated soil condition.

When selecting land of the Woombye loam type, it is particularly important to avoid depressions and areas in which the surplus surface water cannot readily drain away. Pineapples growing on these areas are susceptible to wilt and top rot. A sloping site is preferable, and the plant rows should be given sufficient fall to ensure the removal of run-off water. Each row should carry its own water only, and, if this is taken off by cross drains at intervals not greater than one chain, erosion will be reduced to a minimum.

The Woombye loam may be very successfully utilised for pineapple culture. With careful management and adequate fertilization the production from replanted areas compares favourably with that from new land.

The Sandy Loams.

A group of soils which are extensively used for pineapple production in the Nambour-Woombye-Palmwoods area are characterised by a sandy loam surface horizon. This group contains three main soil types, as follows:—(*a*) Woombye sandy loam, (*b*) Coe's Creek sandy loam, and (*c*) Palmwoods sandy loam. The Woombye soil is the most important of the three. It occurs on the same slopes and in close

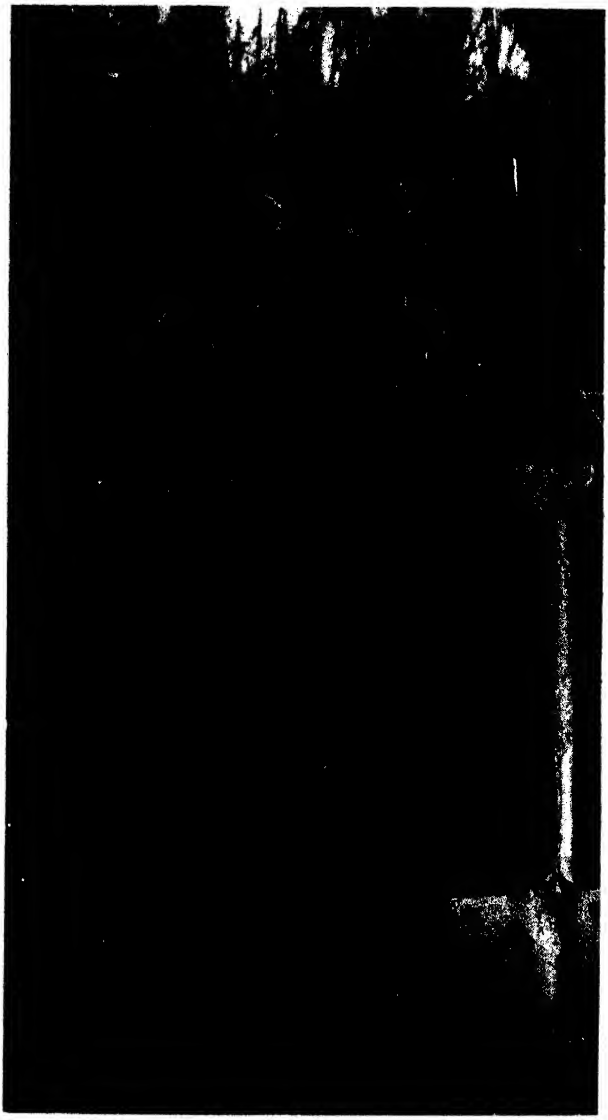


Plate 25.

Woombye Sandy Loam.—Note the absence of a clayey subsoil. The sandy loam surface horizon grades almost imperceptibly into the sub-surface and subsoil horizons. This is in marked contrast to the Palmwoods sandy loam (Plate 26), which shows an abrupt line of demarcation between the surface and sub-surface horizons and the subsoil horizon, due to the increased clay content of the latter.

association with the Woombye loam, to which it is very similar in colour and general appearance. The surface horizon is dark brown, grading into dark reddish brown in the sub-surface. The subsoil is red, and this colour is typical of both the Woombye loam and Woombye sandy loam. The sandy loam surface layer, usually about 6 inches deep, overlies a sub-surface horizon the texture of which is intermediate between sandy loam and loam. The subsoil proper begins at 15 inches

and the texture of this horizon, which extends to a depth of 42 inches, is but slightly heavier than sandy loam. (Plate 25.)

Because of the favourable texture of its various horizons, the Woombye sandy loam is a well-drained soil. It is therefore admirably suited for pineapple culture. A high moisture-supplying power enables it to withstand dry weather to a greater extent than the Woombye loam. Nevertheless, it is important that the soil organic matter should be conserved by every possible means, since a climatic feature of the district is the prevalence of long dry spells. As in the case of the Woombye loam, cover cropping between plantings is beneficial, and the turning in of the old pineapple plants is also a valuable practice. An occasional deep ploughing will serve to loosen up the sandy loam—loam sub-surface which has a tendency to compact after prolonged cultivation. In order to minimise this tendency the land should not be rotary-hoed when the moisture content of the sub-surface horizon imparts even a slight suggestion of stickiness to this layer.

While the drainage of this soil is normally good, it is important to make provision for the disposal of surplus water received from higher levels. A well-planned system of water channels will also decrease erosion of the valuable surface horizon. Since the topography varies greatly between individual areas, it is impossible to lay down hard and fast rules regarding the placement of drains to carry away surplus water. In general, however, it is advisable to lay out the crop rows in the direction of the slope, unless the fall is greater than one in six, in which case the rows should be angled slightly. In either case, cross channels, about 10 inches wide by 10 inches deep, should be provided at intervals of not more than 1 chain.

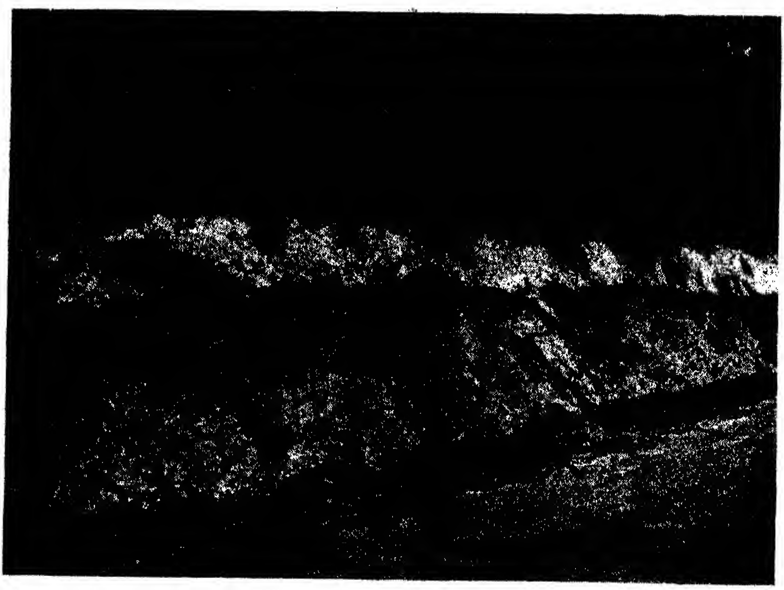


Plate 26.

PALMWOODS SANDY LOAM.—The increased clay content of the subsoil sharply differentiates this horizon from the sandy loam material of the upper layers.

From an agricultural point of view, there is not a great deal of difference between the Coe's Creek sandy loam and the Palmwoods sandy loam. Both of these soils differ considerably from the Woombye sandy loam in the nature of their subsoils. In marked contrast to the open porous nature of the lower horizons of the latter soil, the Coe's Creek and Palmwoods soils possess subsoils which contain a considerable amount of clay. (Plate 26.) Since some coarse sand is also present, the texture can best be described as sandy clay. The colour is yellowish brown and this again distinguishes these soils from the Woombye sandy loam.

The surface and sub-surface horizons are sandy loam in texture and dark brown in colour. The combined depth of these two horizons is usually from 15 inches to 2 feet. Since the soils occur on steep, hilly country, a great deal of the sandy loam material has often been lost by erosion, and where this has occurred the suitability of these soils for pineapple culture is greatly reduced (Plate 27). However, provided the clayey subsoil does not come within 12 inches of the surface, and, provided also that there is sufficient slope to remove surface water, both

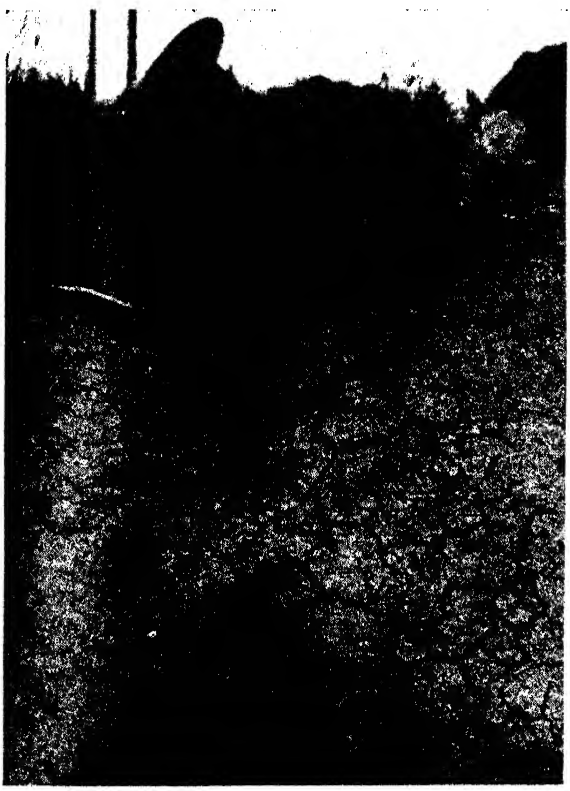


Plate 27.

ERODED PHASE OF PALMWOODS SANDY LOAM.—The presence of cracks on the dried face of the cut is an indication of a high clay content. Since the sandy loam surface and sub-surface horizons have been almost completely eroded, the clay subsoil now extends to within a few inches of the surface. The planting of pineapples on soils of this type is responsible for badly wilted patches in many areas.

these soil types may be planted to pineapples with reasonable success. Deep ploughing is not necessary before planting. Eroded areas should be avoided, as little can be done to ameliorate the unfavourable subsoil conditions. Even if the subsoil is opened up by deep ploughing or subsoiling, it rapidly resumes its original condition when saturated by rain. The moisture retention capacity of the surface and sub-surface horizons is good. As has already been pointed out for the previously described soil types, however, the loss of organic matter rapidly affects moisture availability. Thus, conservation of organic material will considerably increase the replant value of both of these soil types.

The Sand Types.

A great deal of country in the Nambour, Woombye, and Palmwoods districts is charcterised by a sandy surface soil. In these districts many sandy soils are successfully planted with pineapples, while others produce indifferent returns when planted to this crop. During the survey it was found that the major differences in productivity lay in the nature of the subsoils. Four main sand types were recognised, as follows:—

Palmwoods Sand.—The surface soil, which averages about 3 inches deep, is a dark brown to yellowish brown sand. It is somewhat darkened by organic matter, the content of which decreases sharply in the sub-surface horizon. In this latter horizon, the clay increases slightly, the texture being sandy loam to sandy clay loam. The subsoil usually commences at 12 inches deep. This is a sandy clay loam horizon, and is somewhat sticky when wet. Its colour is yellowish brown with a slight reddish tinge. On moderate slopes the drainage is good. This soil erodes easily, and in some cases the sticky clay loam subsoil was observed less than 4 inches from the surface. Such areas should be avoided when selecting land of this type for pineapple culture.

Coe's Creek Sand.—To a depth of 18 inches this type has a sand content of approximately 85 per cent. The colour is grey brown, becoming lighter with depth as the organic matter decreases. Although the clay content increases below a depth of 18 inches, there is still a considerable amount of sand present. The texture of this subsoil can best be described as that of a sandy clay loam, and its colour is greyish yellow or light yellowish brown. In some cases a band of river gravel is met with at depths varying between 2 and 3 feet. Normally the soil is well drained, but as it often occurs on very steep hillsides a considerable amount of erosion may have taken place.

Nambour Sand.—The Nambour sand occurs on many steep slopes in the Rosemount area and also in close proximity to the town of Nambour. It is a greyish brown sand. Very sandy material normally persists to a depth of approximately 2½ feet, below which is a horizon of broken sandstone and clay (Plate 28).

Rosemount Sand.—This soil type is of minor importance, and it occurs chiefly in the Rosemount and Diddillibah districts. The surface and sub-surface horizons are very sandy in texture. At 18 inches deep the proportion of clay increases sharply, and a sticky and almost impervious sandy clay horizon occurs. The soil is distinguished by a characteristic brown colour throughout the surface, sub-surface, and subsoil horizons.

The suitability of these sand types for pineapple culture depends upon the depth of the surface and sub-surface horizons. The steep slopes which these soils usually occupy are particularly subject to erosion so that, quite frequently, much of the sandy surface material has been carried away by storm water. In general, the sticky clay subsoil should be deeper than 12 inches from the surface; otherwise the land is of mediocre value for pineapple culture. Areas which are flat or low lying should be avoided. To avoid losses from wilt and top rot in the shallow phases of these sandy soils, it is essential that the plant rows should be laid out with sufficient fall to ensure the rapid removal of excess water. If there is very little slope the rows should be hilled before planting, in order to prevent storm water from breaking through the rows. An adequate number of cross drains should always be provided at short intervals, the length of the interval depending upon the degree of slope.

These sandy soils have a lower water holding capacity than either the loams or sandy loams. However, the wilting point is also low, so that pineapples growing on the sand types quickly respond to light showers. Nevertheless, it is essential, by every possible means, both to

Plate 28.

NAMBOUR SAND.—The sandy surface and sub-surface horizons are about 2½ feet deep, and overlie a subsoil which consists of broken sandstone and clay. Note the deep root penetration and the overhang of the surface horizon, due to the greater content of organic matter than in the sub-surface horizon. The binding power of organic matter considerably retards erosion in sandy soils.

increase the moisture holding capacity of these soils by building up the soil organic matter, and also to reduce evaporation of moisture from them. With regard to the former, the most practical method is the turning in of the old pineapple crop, as recommended for the loams and sandy loams. Evaporational losses may be reduced by (*a*) close planting, which effectively shades the soil, (*b*) mulching of the soil, particularly on replant land, (*c*) control of weed growth, and (*d*) avoidance of excessive cultivation. The amount of cultivation which is necessary on these sandy soils once they are planted is practically limited to that required to keep down weeds. In the autumn, the soil which has been washed into the inter-row spaces from hilled rows may be lightly thrown back to the plant rows. During the spring, which is normally a very dry period, the surface should be disturbed as little as possible. Stirring the surface of sandy soils will not conserve the moisture of the lower portions; it merely increases evaporation in the disturbed area. Deep ploughing is unnecessary at any period.

Provided careful attention is given to the factors outlined above, these sand types will give very satisfactory results when planted to pineapples. They require little cultivation, and weed control is much easier than on the heavier soils. The most critical period in the life of the pineapple plant on these soils is during the first 12 months of growth. Once the inter-rows spaces are shaded by the plant leaves, however, loss of soil moisture is reduced, so that under proper management and adequate fertilizing these sandy soils produce healthy, vigorous plants which are able to withstand prolonged spells of dry weather.

The Clay Loam.

In the Rosemount portion of the area under review a soil occurs which has a clay loam surface texture, and which is very dark brown to black in colour. The sub-surface layer, which is slightly heavier than the surface layer, is a light clay. The combined depth of these two upper layers is about 12 inches. Beneath these is a greyish brown clay subsoil, about 6 inches thick. This overlies broken, rubbly rock, which is shaley in appearance.

As yet this soil, the Rosemount clay loam, has not been used extensively for pineapple culture. Provided certain conditions, particularly as regards drainage, are fulfilled, however, it may be very successfully used for the production of this crop. Although the texture is relatively heavy, the surface horizon possesses an excellent crumb structure because of its high organic matter content. Consequently it provides a favourable zone for the development of the roots of the pineapple plant. Unfortunately, the surface horizon is never very deep, and a heavy clay subsoil usually occurs at about 12 inches. For this reason young plants, although they make very good growth in the early stages, are apt to be severely affected by top rot during a wet winter. Losses from this disease may be virtually eliminated by running the rows with the slope, thereby giving the inter-row spaces sufficient fall to carry away excess water. On flat land or at the bottom of a slope, the beds should be hilled prior to planting.

CHEMICAL CHARACTERISTICS AND FERTILIZER REQUIREMENTS.

In order to determine the plant food content of the various soil types a large number of samples were submitted to chemical analysis. The results of these analyses have been summarised as follows:—

Organic Matter Content.

The Rosemount clay loam has been found to contain a very satisfactory amount of organic matter, viz., 5·0 per cent. organic carbon. This is by far the highest organic matter content of any of the soil types of the area. In the case of the Woombye loam, there is a sharp drop to values ranging from 2·0 to 3·0 per cent. Although this may be regarded as very fair, it is not far above the minimum required to keep this medium heavy soil in good structural condition. The importance of conserving the organic matter content of this soil type has already been stressed. The Woombye sandy loam, which is lighter in texture than the Woombye loam, contains practically the same amount of organic carbon. Of all the soil types of the area, this is the one most suitable for pineapple culture. Its high capacity to store and supply moisture is directly related to its sandy loam texture and relatively high organic matter content. The Coe's Creek sandy loam and Palmwoods sandy loam contain 1·5 to 2·0 per cent. organic carbon. These values are significantly less than those of the Woombye loam. Of the sand types, the Coe's Creek sand and Palmwoods sand contain the largest amounts. The values are low and vary from 1·0 to 2·0 per cent. The organic matter contents of the Rosemount sand and of the Nambour sand are both very low and are frequently less than 1·0 per cent.

Nitrogen.

The average nitrogen content of the soils examined is less than 0·1 per cent. Moreover, a great deal of this is present in a form which is not available to plants, so that the amount of available nitrogen which is contained in these soils is wholly inadequate for the successful production of pineapples. A dressing of at least 100 lb. of sulphate of ammonia should be given annually to every 1,000 plants, and fertilizer trials now in progress indicate that this amount could probably be increased with advantage.

Potash.

The amount of potash in the soil types varies considerably. In some, the content of available potash (calculated as sulphate of potash) is approximately 870 lb. per acre to a depth of 12 inches; in others it falls to below 280 lb. per acre foot. Experimental work has shown that even the larger of these two amounts is insufficient to support a well-grown pineapple crop without the addition of potassic fertilizers. For pineapples grown in the Nambour-Woombye-Palmwoods area it is recommended at present that every 1,000 plants should receive annually not less than 20 lb. of sulphate of potash, though experiments now in progress indicate that increased yields may result from even larger applications of this fertilizer constituent.

Phosphoric acid.

In all the soils of the district there is a pronounced deficiency of readily soluble phosphoric acid under virgin conditions. The average content found was equivalent to a dressing of only 50 lb. of super-

phosphate per acre. It is evident, therefore, that the profitable production of pineapples on these soils necessitates the regular application of phosphatic fertilizers. Superphosphate is an excellent medium for supplying the additional phosphoric acid required on these soils. It should be applied at the rate of not less than 30 lb. annually to every 1,000 plants.

The general lack of available plant foods which characterises the soils of the Nambour, Woombye, and Palmwoods districts is common to the majority of coastal soils of southern Queensland. For successful pineapple production in these areas, therefore, it is evident that the fertilizer programme adopted should be one in which the three main plant foods —nitrogen, phosphoric acid, and potash—are supplied in adequate quantities. In addition, it is essential that the fertilizer programme should be correctly *balanced,* i.e., the plant foods should be applied in the proportions in which they are required by a given plant crop when grown on a particular type of soil, since insufficiency of one constituent at any one time may limit the extent to which the others can be utilised.

A balanced fertilizer programme, which will ensure that pineapples grown on any of the various soil types of the Nambour-Woombye-Palmwoods area will receive the amounts of nitrogen, phosphoric acid, and potash recommended in the preceding paragraphs, is as follows:— "10-6-10" mixture applied at the rate of 50 lb. per 1,000 plants in the spring and again in the autumn, supplemented by 25 lb. of sulphate of ammonia per 1,000 plants in midsummer and again in midwinter. A handful of "10-6-10" mixture to every four plants is approximately equivalent to 50 lb. per 1,000, and, similarly, a handful of sulphate of ammonia applied to seven or eight plants gives a dressing of approximately 25 lb. per 1,000. Both of these fertilizers should always be placed well into the base leaves.

Soil Acidity and Sulphur Requirement.

The pineapple plant is sensitive to the acidity of the soil in which it is growing. The degree of acidity of a soil may be measured and is usually termed the "pH value." Thus, a soil which has a *low* acidity has a *high* pH value, i.e., as the amount of acidity increases the pH value decreases. In the Nambour, Woombye, and Palmwoods districts, pineapples make their best growth on soils which are definitely acid, and, therefore, have a somewhat low pH value. Unless the desired degree of acidity is present the plants are stunted and yellowish green to yellow in colour. Moreover, the growth is "spiky," the leaves being characteristically narrow and erect. A plant of this type is markedly susceptible to attack by root-destroying fungi and other disease organisms. Wilt is often prevalent on soils which are not sufficiently acid.

The various soil types in the area surveyed do not show very great differences in their pH values. In general they lie within the range pH 5·6 to 6·0. This is somewhat higher than desirable, since previous work has shown that for optimum growth the acidity of these soils should be maintained in the neighbourhood of pH 5. Therefore, it is necessary to adjust the acidity by the application of powdered sulphur. This should be broadcast evenly over the ploughed ground some four to six weeks before planting, and then harrowed in, since the sulphur requires to be intimately mixed with the soil before the reaction takes

place. The amount of sulphur required varies with the initial pH and also the texture of the soil: in general the higher the pH value, or the heavier the texture, the greater the dressing which should be applied. The sulphur applications required to bring each of the various soil types of the district to the desired degree of acidity have been calculated, and are given in the accompanying table.

TABLE I.

SULPHUR REQUIREMENT OF SOIL TYPES.

Initial pH.	6·5–6·0.	5·9–5·8.	5·7–5·6.	5·5–5·4.
	lb. per acre.	lb. per acre.	lb. per acre.	lb. per acre.
Clay loam	..	..	500	300
Loam	600	500	400	300
Sandy loams	500	400	300	200
Sands	400	300	200	200

QUEENSLAND SHOW DATES FOR 1941.

February.

Stanthorpe ... 6th to 8th
Killarney ... 14th and 15th
Warwick ... Postponed
Clifton ... Postponed

March.

Allora ... 7th and 8th
Pittsworth ... 11th and 12th
Millmerran ... 14th
Goombungee ... 15th
Toowoomba ... 24th to 27th

April.

Dalby ... 1st and 2nd
Tara ... 4th and 5th
Chinchilla ... 8th and 9th
Miles ... 16th
Nanango ... 23rd and 24th
Kingaroy ... 30th and 1st and 2nd May

May.

Monto ... 1st to 3rd
Goondiwindi ... 2nd and 3rd
Longreach ... 5th to 7th
Mundubbera ... 7th and 8th
Blackall ... 12th and 13th
Gayndah ... 14th and 15th
Murgon ... 15th to 17th
Beaudesert Show ... 14th and 15th
Beaudesert Campdraft ... 16th and 17th
Mitchell ... 21st and 22nd
Biggenden ... 22nd and 23rd
Ipswich ... 27th to 30th
Gympie ... 29th to 31st
Kalbar ... 31st

June.

Maryborough ... 5th to 7th
Lowood ... 6th and 7th
Childers ... 9th and 10th
Boonah ... 11th and 12th
Bundaberg ... 12th to 14th
Gladstone ... 18th and 19th
Rockhampton ... 24th to 28th
Toogoolawah ... 27th and 28th

July.

Proserpine ... 4th and 5th
Charters Towers ... 10th to 12th
Nambour ... 10th to 12th
Rosewood ... 11th and 12th
Townsville ... 15th to 17th
Laidley ... 16th and 17th
Cleveland ... 18th and 19th
Gatton ... 22nd to 24th
Cairns ... 22nd to 24th
Innisfail ... 25th and 26th
Atherton ... 29th and 30th
Crow's Nest ... 30th and 31st
Home Hill ... 31st July and 1st August

August.

Pine Rivers ... 1st and 2nd
Royal National, Brisbane 11th to 16th

September.

Imbil ... 5th and 6th
Rocklea ... 13th
Beenleigh ... 19th and 20th

The Distribution of the Sheep Body Louse, *Bovicola ovis*, in Queensland.

F. H. S. ROBERTS, D.Sc., Animal Health Station, Yeerongpilly.

THREE species of lice have been recorded from sheep in Queensland—namely, the body louse or red-headed louse, *Bovicola ovis,* the foot louse, *Linognathus pedalis,* and *Linognathus ovillus,* which in other countries infests the face. The presence of *L. ovillus* in this State must be regarded, however, with some doubt. It has never been seen by the writer, who considers that in the past it has been confused with the foot louse.

During recent years the Department has viewed with concern reports that lice are gradually extending their distribution within the State and were appearing in localities in the West, where lice had never previously been seen. As a first step towards the control of these pests, stock inspectors throughout the State were requested to report on the status of the infestations within their respective districts. From these reports, together with information already in the Department's possession, it was shown that the body louse constituted by far the more important species. Whilst the foot louse appears to have a wide distribution extending as far west as Cloncurry, Longreach, Winton, and Charleville, it occurs in only more or less isolated localities.

The accompanying map shows the distribution of the body louse as known at present. Permanent infestations may be said to occupy a rough triangle in the sheep country, bounded on the east by the edge of the sheep country, and on the west by a line drawn through Aramac, Barcaldine, Blackall, and Charleville to the interstate border. The apex of the triangle is located south of Hughenden and Prairie. Isolated infestations, it will be observed, are shown west of Cunnamulla and Barcaldine. Body lice have been reported from these localities, though it is not known whether lice are still present there. There are also a few areas east of the true sheep country where lice have been reported in isolated flocks—e.g., around Brisbane, on the North Coast, in the Dawson Valley, and on the Atherton Tableland south-west of Cairns.

Undoubtedly the most heavily-infested areas include the Darling Downs and the Springsure-Jericho-Clermont-Emerald area. Extending west from these areas the infestations gradually thin out to eventually confine themselves to isolated localities.

The conditions governing the distribution of sheep lice in Queensland are in the light of our present knowledge a matter of conjecture. It is not intended here to enter upon a discussion of the relative importance of the many possible factors which may be concerned. It may be of interest, however, to merely mention those factors which come to mind, such as stock movements, rainfall, atmospheric humidity, temperature, certain wool characteristics associated with climatic variations, and possibly variable methods of sheep management.

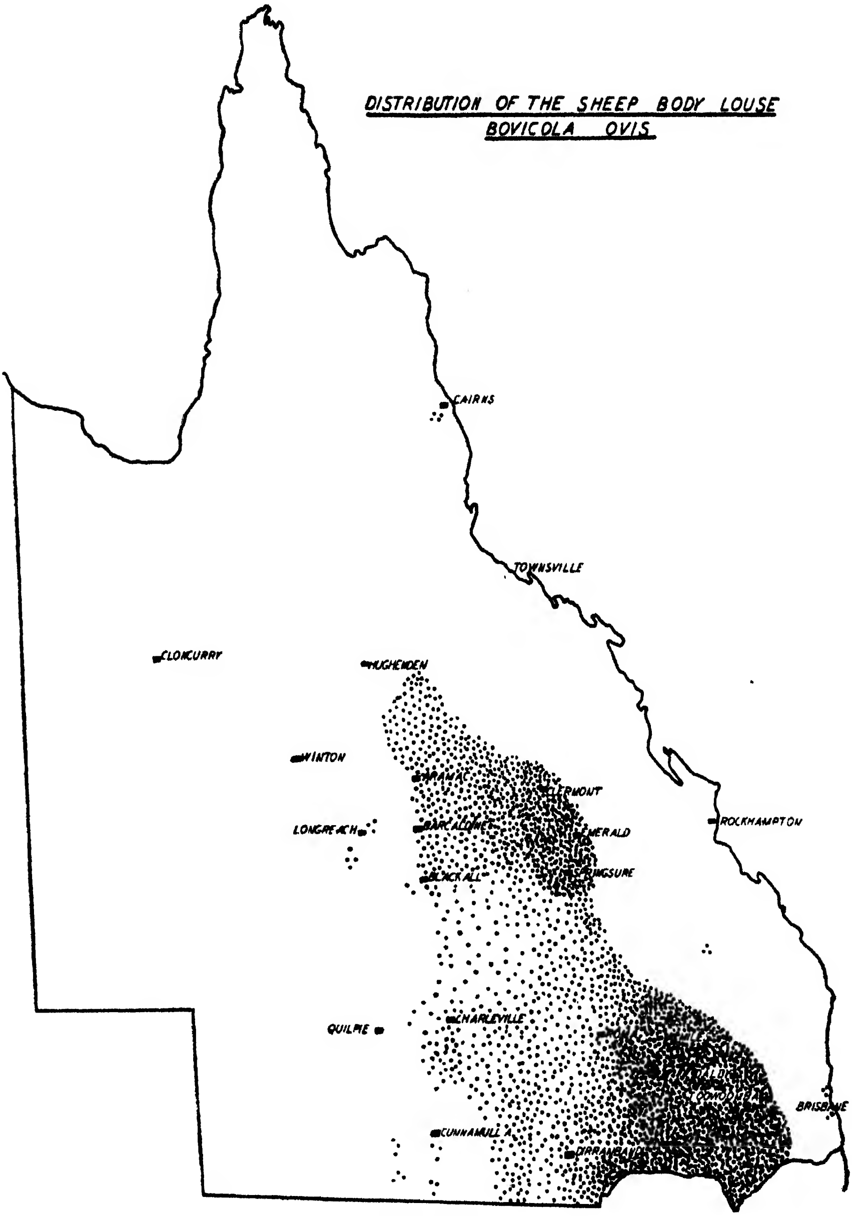

DISTRIBUTION OF THE SHEEP BODY LOUSE
BOVICOLA OVIS
CAIRNS
TOWNSVILLE
CLONCURRY
HUGHENDEN
WINTON
LONGREACH
ROCKHAMPTON
QUILPIE
CHARLEVILLE
CUNNAMULLA
BRISBANE

Plate 29.

Harvesting and Packing Cantaloupes.

J. H. GREGORY, Instructor in Fruit Packing.

WHEN sending cantaloupes or rock melons long distances every care should be taken in their handling. Observations have shown that up to 15 per cent. of fruit is damaged during transit to market as a result of bad handling alone. Bags are not recommended as picking containers, the best type of container being a basket or can with solid sides. A kerosene tin cut lengthways and fitted with a handle makes a suitable container.

The fruit should be kept as cool as possible at all times and should not be rolled or tipped. In Australian districts indication of maturity is not generally of a definite nature. The method adopted in America is to study the way the stalk falls or "slips" from the fruit, the manner in which the skin is lined or "netted," and the ground colour of the skin. A combination of these is taken as a guide.

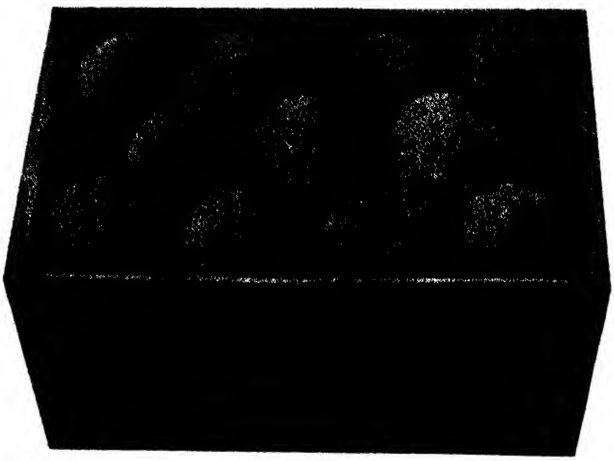


Plate 30.

SHOWING THE METHOD OF PACKING THE 2-1 PACK.—This pack contains three layers and, as illustrated, would contain the following in each layer:—1st layer, 11; 2nd layer, 10; 3rd layer, 11—total, 32.

For shipping short distances the melons may be picked at "full slip," that is, just as soon as the melon will separate cleanly under moderate pressure of finger or thumb without affecting the rind.

At the commencement of the season it is possible to ship melons long distances at "full slip," but this practice is not recommended for mid and late season fruit. For long distances the fruit should be picked at the "half slip" stage, that is, when only part of the stem will pull away cleanly. At this stage it is recommended that the melons be cut. Before any melons are ready the "netting" on the fruit must be well raised up and rounded.

Yellow varieties should show a tinge of colour underlying the green ground colour of the skin. Green varieties lose their "flat," "dead"

greenish colour, becoming bright. In hot weather it is advisable to pick at least once every day. Pickers can soon become familiar with maturity by occasionally cutting and tasting specimens.

One is often impressed with the haphazard manner in which many of the products of the land are still marketed. Bags, loose heaps, and other unhygienic methods are used to bring in and display these goods. It has been found possible to use methods of packing for all small types of melons, enabling first-rate articles to be obtainable on the market.

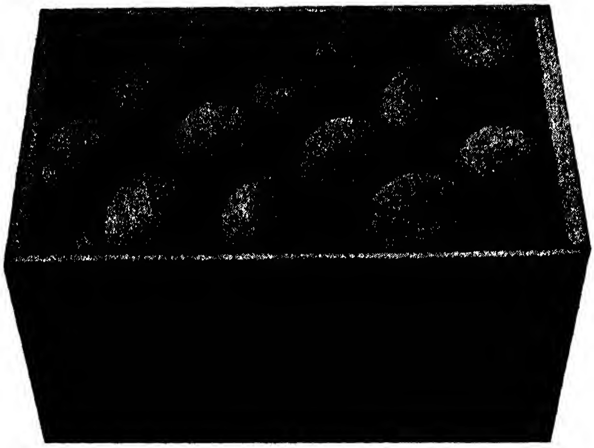


Plate 31.

SHOWING THE METHOD OF PACKING THE 2-2 PACK.—Each layer contains the same number of melons.

Rock melons are no exception to the general haphazard ways of handling commodities for market. It is possible to use the same method of packing for melons as for apples and other fruit, to assist in placing them on the market in a better condition. It has been found that the standard bushel case as made for apples is the most satisfactory type of container. The internal dimensions of this case are 18 inches long by 11½ inches wide by 10½ inches deep. The illustration will serve to show the packing method used. The same system of diagonal packing as is used for all fruit packing has been adopted in this pack. One layer is a replica of another, each melon in every layer except the first fitting into the "pockets" or spaces of the layer beneath. By using this method, it is quite easy, when the pack is finished, to mark the correct number or "count" of the contents of the case. Care in handling is vitally necessary, and no difficulties should be found if common sense is used.

The following are the principal features to be borne in mind:—

1. Grade the melons into approximately the same sizes before beginning to pack.

2. Place the flower or bottom end of the melons in the pockets or spaces for protection, as it is this part of the melon which softens first when ripening.

3. Place the second and successive layers in the pockets of the layers beneath.

4. When counting some of the 2-1 packs, such as that illustrated, it should be noted that the top and bottom layers contain one more than the centre layer—viz., top layer, 11; second layer, 10; bottom layer, 11—total, 32.

5. Pack ¾ to 1 inch above the top of the box and gently ease into position before nailing lid on.

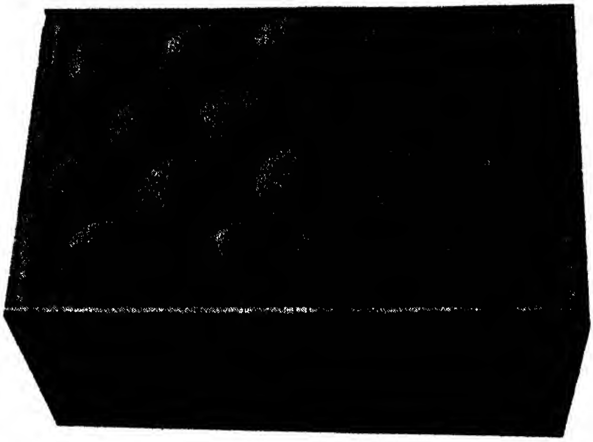


Plate 32.

ANOTHER 2-2 PACK ILLUSTRATED.—2-2 packs can contain either three or four layers according to the size of the melons.

6. A piece of wood, 3 inches by 2 inches, is placed under one end whilst easing the fruit into position with a gentle bump.

7. Always stack the packed cases on their sides when carting or railing to market.

8. Brand the number of melons in the case clearly upon its end.

The same type of packing may be used if packing the fruit in the tropical fruit case, 24¾ inches long by 12 inches wide by 12 inches deep.

Stencil the agent's brand on both ends of the case to avoid extra handling.

FRUIT JUICES AS SUMMER DRINKS.

In a warm climate, people should be induced to drink their fruit as well as eat it. There has been an extraordinary increase in the quantity of fruit juice consumed in America, and this has had a remarkable influence on the food habits of the whole nation. Great strides have been made in nutrition research, and commerce has been quick to adapt itself to the new food technique. In all these changes the fruitgrower has come definitely into the picture. Primary products have hitherto found their markets without science or system, although they are just as adaptable to modern merchandising methods as those of the manufacturer.

Primary producers, obviously, should keep on organizing themselves and their industry, especially on the marketing side. Rigid standardisation of high-grade products, duly branded and guaranteed, and widely advertised, is the chief requirement. With summer still with us, it would be an excellent plan to concentrate on advertising our wonderfully nutritious fruit juices—natural juices, not synthetic substitutes.

Queensland Butter Production.

G. B. GALLWEY, A.F.I.A., A.A.I.S., Inspector of Accounts.

THE accompanying tables cover the operations of all butter factories in Queensland for the year ended 30th June, 1940.

The make and pay figures are compiled from the monthly returns which each factory is required to furnish under *The Dairy Produce Acts.* Consequently, the figures show the total quantity of butter made by the factory and the quantity of each grade—actually the grades into which the butter has been made.

The pay figures show the total of butter paid for and the quantity of each particular grade for which the supplier has received payment.

There is a natural relationship between both sets of figures, and a scrutiny of them will show whether the quantity of butter manufactured in grades can be equitably reconciled with the quantity paid for in grades.

While it is admitted that it is not possible to make the same amount of butter as is paid for, the discrepancy as shown in many instances in these published figures suggests the consideration of necessary action by directorates and managements of dairy associations in respect of the correct grading of cream and the manufacture and payment for butter in accordance with the true grade.

Over-run is shown as that actually obtained, and the quantity paid to suppliers. It will be noted that there is considerable variation among different factories. It is considered that actual over-run should not exceed 3 per cent. Investigations on this matter are being undertaken.

Particulars showing the percentage of each factory's output submitted to official grading have been included this year. This percentage represents the butter sold for export or on the Brisbane market. Butter sold within the State direct from the factory is not graded.

The official gradings of butter indicate the result of the factory gradings when submitted to the Commonwealth and State graders.

Butter is packed as choice, first, and second. Particulars are shown in the tables of the number of boxes submitted under each grade, the quantity and percentage that is true to grade, and the quantity and percentage that has been de-graded—in other words, the opinion of the graders on the factory gradings. It should be noted that where no percentages are shown the factory has not submitted any butter of that grade for official grading.

The markets for which butter is graded are: Export Brisbane, Interstate, and East.

As this is the second year in respect of which these tables have been prepared, it is interesting to note the reaction of the various factories.

For the year ended 30th June, 1939, comments were furnished to each factory. The figures now published indicate that in some cases a decided improvement has been made in the general result of the operations; in others the position has remained stable, whilst some factories have made no attempt to take steps to rectify what are serious discrepancies.

After the compilation of the results of the 1941 operations, serious consideration will have to be given as to the steps necessary to improve the position of those factories which do not respond voluntarily.

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940

Factory.		Make and Pay in Lb.					Overrun.		
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Make Graded.
									Per cent.
Malanda	Made	3,053,988	3,053,988	..	..	..	93,615 lb.	94,694 lb.	15·3
	Paid	3,055,067	3,052,258	..	2,809	..	3·1 %	3·2 %	
Bushy Creek	Made	127,107	..	127,107	..	..	3,707 lb.	3,721 lb.	..
	Paid	127,121	..	127,121	..	..	3·0 %	3·0 %	
Daintree	Made	168,151	..	167,174	..	977	5,430 lb.	5,430 lb.	3·1
	Paid	168,151	..	167,174	..	977	3·1 %	3·1 %	
Evelyn	Made	532,911	530,837	..	2,074	..	16,390 lb.	16,802 lb.	4·0
	Paid	533,323	531,976	..	1,347	..	3·1 %	3·2 %	
Fraser	Made	8,086	..	8,012	74	..	Underrun	..	..
	Paid	10,341	..	10,267	74	..	2,255 lb.	..	
Millaa Millaa	Made	999,702	987,534	..	12,168	..	33,039 lb.	31,729 lb.	6·6
	Paid	998,392	987,143	..	11,249	..	3·4 %	3·3 %	
Silkwood	Made	69,708	..	65,652	..	4,056	Underrun	..	..
	Paid	71,024	..	66,794	..	4,230	1,316 lb.	..	
Gladstone	Made	2,739,768	445,166	1,129,651	1,143,671	21,280	53,688 lb.	51,653 lb.	78·7
	Paid	2,737,733	302,417	1,364,664	1,070,652	..	1·9 %	1·8 %	
Biloela	Made	2,883,048	711,952	1,588,608	582,488	..	52,271 lb.	51,795 lb.	79·0
	Paid	2,882,572	649,150	1,700,696	532,693	33	1·8 %	1·8 %	
Bundaberg	Made	2,414,513	909,512	1,154,065	350,936	..	46,157 lb.	56,897 lb.	66·9
	Paid	2,427,986	913,059	1,198,657	316,270	..	1·9 %	2·4 %	

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.	Official Grading of Butter Submitted as Choice (Boxes).					Official Grading of Butter Submitted as First (Boxes).				Official Grading of Butter Submitted as Second (Boxes).		
	Total.	Choice.	First.	Second.	Pastry.	Total.	First.	Second.	Pastry.	Total.	Second.	Pastry.
Malanda	8,344	7,728 92·6%	616 7·4%	..	..	..	..	..	..	..	..	..
Bushy Creek ..	..	..	..	..	..	..	..	..	..	..	..	..
Daintree	..	..	..	..	..	93	..	93 100%	..	..	..	..
Evelyn	..	..	..	..	..	388	327 84·3%	61 15·7%	..	37	37 100%	..
Fraser	..	..	..	..	..	..	..	..	..	..	..	..
Millaa Millaa ..	302	302 100%	..	..	..	682	682 100%	..	..	195	65 33·3%	130 66·7%
Silkwood	..	..	..	..	..	..	..	..	..	..	..	..
Gladstone ..	334	301 90·1%	33 9·9%	..	..	18,350	18,215 99·3%	135 ·7%	..	19,806	18,718 94·5%	1,088 5·5%
Biloela	4,285	2,817 65·7%	1,468 34·3%	..	..	26,350	24,752 93·9%	1,598 6·1%	..	10,035	9,603 95·7%	432 4·3%
Bundaberg ..	6,729	6,729 100%	..	..	..	16,331	16,279 99·7%	52 ·3%	..	5,757	5,656 98·3%	101 1·7%

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued*.

Factory.		Make and Pay in Lb.					Overrun.		
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Make Graded.
									Per cent.
Mackay	Made	835,267	683,293	134,319	17,655	..	4,243 lb.	21,748 lb.	2·1
	Paid	854,781	639,260	149,403	66,118	..	1·5 %	2·6 %	
Monto	Made	4,221,610	1,656,800	2,319,240	245,570	..	86,982 lb.	95,871 lb.	81·4
	Paid	4,230,499	1,614,546	2,427,712	188,241	..	2·1 %	2·3 %	
Rockhampton	Made	2,471,653	1,053,439	962,724	455,490	..	11,613 lb.	39,727 lb.	33·6
	Paid	2,499,767	563,289	1,501,043	435,435	..	·5 %	1·7 %	
Wowan	Made	2,399,323	172,085	1,223,042	962,924	41,272	42,314 lb.	55,922 lb.	75·3
	Paid	2,412,931	446,561	1,062,156	904,214	..	1·8 %	2·4 %	
Gayndah	Made	2,231,374	1,532,194	541,876	157,304	..	77,232 lb.	77,136 lb.	97·6
	Paid	2,231,278	1,600,491	521,770	109,017	..	3·6 %	3·6 %	
Maryborough	Made	1,227,950	662,076	483,638	82,236	..	51,060 lb.	52,988 lb.	40·2
	Paid	1,229,878	650,921	509,674	69,283	..	4·3 %	4·4 %	
Biggenden	Made	2,599,769	2,093,753	486,920	19,096	..	94,740 lb.	94,889 lb.	98·2
	Paid	2,599,918	2,164,804	430,565	4,549	..	3·8 %	3·8 %	
Kingaroy	Made	5,132,073	4,797,971	110,320	223,782	..	254,147 lb.	251,098 lb.	77·1
	Paid	5,129,024	4,866,406	97,395	165,223	..	5·2 %	5·2 %	
Mundubbera	Made	3,470,560	3,044,624	310,912	115,024	..	119,317 lb.	119,454 lb.	97·0
	Paid	3,470,697	3,093,127	302,825	74,745	..	3·6 %	3·6 %	
Wondai	Made	3,773,996	3,201,732	529,648	42,616	..	150,202 lb.	150,558 lb.	96·8
	Paid	3,774,352	3,262,854	482,779	28,719	..	4·1 %	4·1 %	

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.	Official Grading of Butter Submitted as Choice (Boxes).					Official Grading of Butter Submitted as First (Boxes).				Official Grading of Butter Submitted as Second (Boxes).		
	Total.	Choice.	First.	Second.	Pastry.	Total.	First.	Second.	Pastry.	Total.	Second.	Pastry.
Mackay	..	..	..	..	..	..	..	..	..	317	203 64·1%	114 35·9%
Monto	21,111	17,417 82·5%	3,694 17·5%	..	..	36,069	34,653 96·5%	1,416 3·5%	..	4,377	3,626 82·9%	751 17·1%
Rockhampton ..	..	..	..	..	..	6,438	4,639 72·3%	1,799 27·7%	..	8,392	7,616 90·8%	776 9·2%
Wowan	..	..	..	..	..	14,282	10,450 73·2%	3,832 26·8%	..	17,927	16,749 94·0%	1,178 6·0%
Gayndah	26,287	24,418 92·9%	1,835 7·0%	34 ·1%	..	9,487	7,858 82·9%	1,629 17·1%	..	2,958	2,134 72·2%	824 27·8%
Maryborough ..	3,232	1,492 46·1%	1,712 53·0%	10 ·3%	18 ·6%	4,205	3,298 78·4%	907 21·6%	..	1,378	753 54·6%	625 45·4%
Biggenden ..	36,594	22,634 61·9%	12,263 33·5%	642 1·7%	1,055 2·9%	8,498	6,876 80·9%	1,477 17·4%	145 1·7%	477	345 72·4%	132 27·6%
Kingaroy	64,508	62,108 96·3%	2,400 3·7%	..	..	2,108	1,333 63·2%	775 36·8%	..	4,104	3,606 88·0%	498 12·0%
Mundubbera ..	52,376	28,130 53·7%	24,111 46·1%	135 ·2%	..	5,633	2,117 37·6%	3,516 62·4%	..	2,056	1,716 83·4%	340 16·6%
Wondai	54,883	45,058 82·09%	9,806 17·88%	19 ·03%	..	9,390	7,554 80·5%	1,836 19·5%	..	959	792 82·6%	167 17·4%

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.		Make and Pay in Lb.					Overrun.		
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Make Graded.
									Per cent.
Nanango	Made	3,142,160	1,744,736	1,248,072	149,352	..	77,336 lb.	76,271 lb.	97·8
	Paid	3,141,095	2,368,145	721,554	51,396	..	2·5 %	2·5 %	
Murgon	Made	4,102,966	3,543,788	528,050	30,128	..	111,435 lb.	112,533 lb.	93·3
	Paid	4,104,064	3,646,551	441,118	16,395	..	2·7 %	2·8 %	
Proston	Made	1,938,599	1,541,229	362,986	34,384	..	38,733 lb.	39,265 lb.	98·2
	Paid	1,939,131	1,615,617	299,892	23,622	..	2·0 %	2·0 %	
Cooroy	Made	1,640,898	1,258,306	342,440	40,152	..	45,365 lb.	46,312 lb.	93·9
	Paid	1,641,845	1,362,301	254,445	25,099	..	2·8 %	2·9 %	
Gympie	Made	7,954,812	7,312,438	508,480	133,894	..	211,920 lb.	213,295 lb.	94·4
	Paid	7,956,187	7,482,133	383,762	90,292	..	2·7 %	2·8 %	
Chinchilla	Made	2,618,348	902,900	1,327,368	386,792	1,288	68,585 lb.	66,055 lb.	95·4
	Paid	2,615,818	999,638	1,324,707	291,059	414	2·7 %	2·6 %	
Toowoomba	Made	5,578,990	4,294,798	1,072,848	211,344	..	150,461 lb.	163,511 lb.	84·0
	Paid	5,592,040	4,305,593	1,074,283	212,164	..	2·7 %	3·0 %	
Clifton	Made	1,766,873	874,457	651,672	240,744	..	51,547 lb.	51,657 lb.	96·8
	Paid	1,766,983	887,459	667,381	212,143	..	3·0 %	3·0 %	
Crow's Nest	Made	2,075,640	1,523,144	481,768	70,728	..	62,299 lb.	62,329 lb.	99·3
	Paid	2,075,670	1,523,436	481,639	70,595	..	3·0 %	3·1 %	
Dalby	Made	4,237,191	1,895,327	1,861,552	478,184	2,128	130,486 lb.	132,192 lb.	93·9
	Paid	4,238,897	1,904,702	1,875,850	456,386	1,959	3·1 %	3·2 %	

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued*.

Factory.	Official Grading of Butter Submitted as Choice (Boxes).					Official Grading of Butter Submitted as First (Boxes).				Official Grading of Butter Submitted as Second (Boxes).		
	Total.	Choice.	First.	Second.	Pastry.	Total.	First.	Second.	Pastry.	Total.	Second.	Pastry.
Nanango	29,725	18,928 63·7%	10,797 36·3%	..	..	22,036	21,012 95·3%	1,024 4·7%	..	2,755	2,388 86·7%	367 13·3%
Murgon	58,665	51,492 87·8%	7,173 12·2%	..	..	9,418	8,346 88·6%	1,072 11·4%	..	472	214 45·3%	258 54·7%
Proston	26,940	21,400 79·4%	5,540 20·6%	..	..	6,491	4,913 75·7%	1,578 24·3%	..	588	514 87·4%	74 12·6%
Cooroy	20,788	15,491 74·6%	5,297 25·4%	..	..	6,040	5,577 92·4%	463 7·6%	..	708	622 88·4%	82 11·6%
Gympie	122,620	107,322 87·53%	15,269 12·45%	29 ·02%	..	9,177	6,382 69·6%	2,795 30·4%	..	2,293	1,842 80·4%	451 19·6%
Chinchilla ..	14,318	4,196 29·4%	10,031 70·0%	91 ·6%	..	23,783	19,804 83·3%	3,979 16·7%	..	6,535	5,283 80·9%	1,252 19·1%
Toowoomba ..	60,576	58,768 97·1%	1,808 2·9%	..	..	19,314	19,157 99·2%	157 ·8%	..	3,838	3,793 98·8%	45 1·2%
Clifton	14,569	12,072 82·9%	2,422 16·6%	75 ·5%	..	11,712	11,282 96·3%	430 3·7%	..	4,267	4,193 98·3%	74 1·7%
Crow's Nest ..	26,825	21,695 81·9%	4,800 17·9%	330 1·2%	..	8,662	8,058 93·2%	604 6·8%	..	1,328	1,274 96·0%	54 4·0%
Dalby	29,969	28,706 95·8%	1,263 4·2%	.. ..	..	33,277	33,091 99·4%	186 ·6%	..	8,527	8,254 96·8%	273 3·2%

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.		Make and Pay in Lb.					Overrun.		
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Make Graded.
									Per cent.
Goombungee	Made	1,986,874	1,389,578	515,312	81,984	..	72,431 lb.	72,439 lb.	99·8
	Paid	1,986,882	1,395,932	513,284	77,666	..	3·7 %	3·7 %	
Jandowae	Made	2,978,078	1,660,118	937,104	379,512	1,344	100,470 lb.	100,613 lb.	98·6
	Paid	2,978,221	1,674,579	940,435	361,816	1,391	3·4 %	3·5 %	
Miles	Made	1,189,897	240,502	750,490	190,897	8,008	30,747 lb.	31,547 lb.	95·7
	Paid	1,190,697	240,901	750,549	191,241	8,006	2·6 %	2·7 %	
Killarney	Made	1,631,020	976,198	537,278	117,544	..	42,165 lb.	42,216 lb.	84·1
	Paid	1,631,071	984,640	553,661	92,770	..	2·7 %	2·7 %	
Milmerran	Made	1,689,824	572,720	857,250	246,694	13,160	30,193 lb.	30,341 lb.	99·2
	Paid	1,689,972	613,054	858,783	218,135	..	1·8 %	1·8 %	
Oakey	Made	5,835,966	4,584,030	642,264	518,560	91,112	223,620 lb.	225,286 lb.	92·2
	Paid	5,837,632	4,823,325	650,696	363,611	..	3·9 %	4·0 %	
Roma	Made	1,243,934	..	714,230	529,704	..	33,149 lb.	33,512 lb.	60·7
	Paid	1,244,297	152,384	631,147	458,994	1,772	2·7 %	2·8 %	
Warwick	Made	3,637,375	2,665,271	653,576	318,528	..	65,762 lb.	64,829 lb.	78·8
	Paid	3,636,442	2,685,290	668,234	282,918	..	1·8 %	1·7 %	
Allora	Made	1,650,792	1,188,966	436,275	25,551	..	45,445 lb.	47,702 lb.	97·5
	Paid	1,653,049	1,200,455	426,106	26,488	..	2·8 %	2·9 %	
Texas	Made	215,978	183,950	2,912	29,116	..	5,370 lb.	5,429 lb.	1·4
	Paid	216,037	106,341	82,112	27,584	..	2·5 %	2·5 %	

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.	Official Grading of Butter Submitted as Choice (Boxes).					Official Grading of Butter Submitted as First (Boxes).				Official Grading of Butter Submitted as Second (Boxes).		
	Total.	Choice.	First.	Second.	Pastry.	Total.	First.	Second.	Pastry.	Total.	Second.	Pastry.
Goombungee ..	24,388	21,136 86·66%	3,234 13·26%	18 ·08%	..	9,179	8,232 89·7%	947 10·3%	..	1,498	1,389 93·4%	99 6·6%
Jandowae ..	29,092	25,739 88·5%	3,353 11·5%	..	..	16,550	16,022 96·8%	528 3·2%	..	6,824	6,667 97·7%	157 2·3%
Miles	2,433	1,448 59·5%	985 40·5%	..	..	13,266	12,962 97·7%	304 2·3%	..	3,388	2,922 80·1%	476 19·9%
Killarney	14·681	9,633 65·6%	5,048 34·4%	..	..	7,739	7,374 95·3%	365 4·7%	..	2,083	2,021 97·0%	62 3·0%
Milmerran.. ..	9,675	8,748 90·42%	922 9·53%	5 ·05%	..	15,355	14,283 93·1%	1,072 6·9%	..	4,907	4,359 88·8%	548 11·2%
Oakey	72,963	59,057 80·9%	13,906 19·1%	..	..	12,184	10,990 90·1%	1,194 9·9%	..	10,968	9,181 83·6%	1,787 16·4%
Roma	..	..	..	..	..	4,271	4,143 97·0%	128 3·0%	..	9,212	9,173 99·6%	39 ·4%
Warwick	33,498	19,345 57·7%	14,066 42·0%	87 ·3%	..	11,912	11,101 93·2%	811 6·8%	..	5,741	5,596 97·5%	145 2·5%
Allora	20,497	17,508 85·5%	2,989 14·5 %	..	..	7,788	7,708 99·0%	80 1·0%	..	479	436 91·0%	43 9·0%
Texas	..	..	..	..	..	64	39 60·3%	25 39·7%	..	496	378 76·4%	118 23·6%

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.		Make and Pay in Lb.					Overrun.		
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Make Graded.
									Per cent.
Inglewood	Made	21,818	16,162	1,344	4,312	..	137 lb.	394 lb.	25·9
	Paid	22,075	7,798	10,226	4,051	..	·5 %	2·0 %	
Caboolture	Made	3,127,316	2,789,618	336,522	1,176	..	81,568 lb.	81,396 lb.	83·7
	Paid	3,127,144	2,874,673	246,203	6,268	..	2·6 %	2·7 %	
Eumundi	Made	2,267,564	1,983,549	194,589	89,426	..	50,736 lb.	51,509 lb.	92·2
	Paid	2,268,337	2,021,904	187,064	59,369	..	2·3 %	2·3 %	
Pomona	Made	2,436,854	2,039,637	349,091	48,126	..	58,518 lb.	58,324 lb.	99·6
	Paid	2,436,660	2,183,409	233,551	19,700	..	2·4 %	2·4 %	
Dayboro	Made	408,534	..	391,278	17,472	784	Underrun	..	92·3
	Paid	421,228	335,055	74,885	11,288	..	12,694 lb.	..	
Esk	Made	2,615,695	1,299,054	1,136,201	180,440	..	84,915 lb.	84,920 lb.	94·4
	Paid	2,615,700	1,308,978	1,172,749	133,973	..	3·3 %	3·3 %	
Beaudesert	Made	4,480,242	3,799,410	654,472	26,360	..	218,255 lb.	217,646 lb.	96·0
	Paid	4,479,633	3,899,218	555,432	24,983	..	5·1 %	5·0 %	
Maleny	Made	2,263,896	2,186,840	45,696	31,360	..	70,968 lb.	71,397 lb.	91·6
	Paid	2,264,325	2,209,181	51,453	3,691	..	3·2 %	3·3 %	
Lowood	Made	676,861	492,337	178,430	6,094	..	18,577 lb.	18,341 lb.	97·1
	Paid	676,625	513,951	157,373	5,301	..	2·8 %	2·8 %	
College	Made	94,710	94,710	..	..	..	963 lb.	962 lb.	3·8
	Paid	94,709	87,863	5,811	1,035	..	1·3 %	1·3 %	

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.	Official Grading of Butter Submitted as Choice (Boxes).					Official Grading of Butter Submitted as First (Boxes).				Official Grading of Butter Submitted as Second (Boxes).		
	Total.	Choice.	First.	Second.	Pastry.	Total.	First.	Second.	Pastry.	Total.	Second.	Pastry.
Inglewood.. ..	..	..	..	..	..	24	24 100%	..	..	77	77 100%	..
Caboolture ..	40,458	34,327 84·9%	5,308 13·1%	697 1·7%	126 ·3%	6,177	3,188 51·3%	2,989 49·7%	..	95	91 95·8%	4 4·2%
Eumundi	32,350	23,922 73·9%	8,428 26·1%	..	..	3,176	1,924 60·8%	1,252 39·2%	..	1,818	1,656 85·6%	162 14·4%
Pomona	35,581	12,233 34·4%	22,989 64·6%	359 1·0%	..	6,759	4,302 63·7%	2,457 36·3%	..	1,006	957 95·2%	49 4·8%
Dayboro	..	..	..	..	..	6,373	6,055 95·0%	318 5·0%	..	380	227 59·7%	153 40·3%
Esk	23,059	16,663 72·26%	6,089 26·4%	153 ·67%	154 ·67%	17,812	16,510 92·7%	1,072 6·0%	230 1·3%	3,319	2,929 91·0%	290 9·0%
Beaudesert ..	64,425	52,635 81·7%	11,790 18·3%	..	..	11,744	9,737 82·9%	2,007 17·1%	..	513	513 100%	..
Maleny	35,578	30,079 84·5%	5,499 15·5%	..	..	894	557 62·7%	337 37·3%	..	560	512 91·4%	48 8·6%
Lowood	8,348	6,935 83·1%	1,413 16·9%			3,287	2,951 89·8%	336 10·2%		106	78 73·6%	28 26·4%
College	64	..	64 100%	..	..	..	..	..	..	..	..	..

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.		Make and Pay in Lb.					Overrun.		
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Make Graded.
									Per cent.
Booval	Made	4,741,962	3,572,364	734,462	433,820	1,316	89,666 lb.	90,705 lb.	79·7
	Paid	4,743,001	3,794,169	649,784	299,048	..	1·9 %	2·0 %	
Boonah	Made	4,492,503	2,772,774	1,488,951	230,778	..	120,750 lb.	120,902 lb.	94·6
	Paid	4,492,655	2,915,141	1,398,916	178,598	..	2·7 %	2·8 %	
Grantham	Made	2,653,728	1,703,170	644,568	305,990	..	92,732 lb.	93,570 lb.	96·2
	Paid	2,654,566	1,833,156	626,012	195,398	..	3·6 %	3·6 %	
Laidley	Made	2,113,507	1,812,770	239,705	61,032	..	65,748 lb.	65,804 lb.	95·8
	Paid	2,113,563	1,865,297	206,206	42,060	..	3·2 %	3·2 %	
Kingston	Made	6,818,280	6,498,128	2,408	317,744	..	208,627 lb.	209,220 lb.	99·7
	Paid	6,818,873	6,555,682	2,649	260,542	..	3·1 %	3·2 %	
Woodford	Made	2,104,800	1,970,059	134,741	..	..	52,003 lb.	51,620 lb.	98·1
	Paid	2,104,417	1,968,234	136,183	..	..	2·5 %	2·5 %	

PRODUCTION AND PAYMENT FOR BUTTER IN GRADES AND OFFICIAL GRADINGS FOR THE 12 MONTHS ENDED 30TH JUNE, 1940—*continued.*

Factory.	Official Grading of Butter Submitted as Choice (Boxes).					Official Grading of Butter Submitted as First (Boxes).				Official Grading of Butter Submitted as Second (Boxes).		
	Total.	Choice.	First.	Second.	Pastry.	Total.	First.	Second.	Pastry.	Total.	Second.	Pastry.
Booval	43,573	37,918 87·1%	5,655 12·9%	..	..	15,916	15,377 96·7%	539 3·3%	..	8,027	6,951 86·6%	1,076 13·4%
Boonah	43,582	32,648 74·9%	10,884 25·0%	60 ·1%	..	28,095	26,543 95·9%	1,552 4·1%	..	4,166	3,814 91·6%	352 8·4%
Grantham ..	28,852	22,473 77·9%	6,379 22·1%	..	..	11,253	9,368 83·3%	1,885 16·7%	..	5,487	5,389 82·1%	98 17·8%
Laidley	30,696	20,763 67·6%	9,933 32·4%	..	..	4,072	3,799 93·3%	273 6·7%	..	1,373	1,362 91·9%	111 8·1%
Kingston	115,718	99,689 86·2%	16,029 13·8%	..	..	43	26 60·5%	17 39·5%	..	5,722	5,514 96·4%	208 3·6%
Woodford ..	33,956	24,945 73·47%	8,991 26·47%	20 ·06%	..	2,714	2,274 83·8%	440 16·2%	..	209	209 100%	..

Bull Indexing.

E. B. RICE and D. J. SHEAHAN, Dairy Branch.

THE separator, the milking machine, and improved farm implements have contributed largely to the elimination of the drudgery associated with old-time methods of dairying. Improvement in pastures and methods of farm management, including the provision of ensilage and the practice of balanced feeding of stock, are among other factors leading to a progressive increase in dairy production. On the manufacturing side, the Babcock tester, neutralisation, pasteurisation, and refrigeration have revolutionised the technique of butter and cheese making.

By improving the standard of dairy cattle, another very important contribution to the progress of the Queensland dairying industry can be made.

The only countries in the world which have shown any marked improvement in the average production of dairy cows are Denmark and Holland. The average annual production of butter-fat in Denmark was recently about 300 lb. per cow, New Zealand about 220 lb., and Victoria 180 lb. In other Australian States the figure has been placed at about 120 lb. per cow, which represents approximately the average annual production in Queensland.

HERD IMPROVEMENT.

The first step towards the improvement of dairy herds was the initiation and development of the Herd Book System, which sets out to tabulate the genealogical history of the families of each breed. The first definite method of selecting animals for their productive capacity was established in 1895, when organised herd-testing was instituted. Justification of this method is evidenced by the fact that there are now approximately between 4,500,000 and 5,000,000 cows being tested in many parts of the world.

Breeding for high production in dairy cattle is based on the generally accepted theory that milk yield and butter-fat content are characters which depend on Mendelian factors (genes), and that they are transmissible according to established Mendelian rules of heredity. Yield recording in dairying is based on this assumption, as also are the Advanced Registers founded on the herd-book and on the results of yield recording.

Until the introduction of Bull Indexing the breeder was faced with the difficulty that the milk and butter-fat yield could be ascertained only for the females of the dairy cattle.

IMPORTANCE OF BULL IN DAIRY HERD.

In a dairy herd the value of a bull is of greater economic importance than the value of the dam, for the number of the progeny of individual bulls is considerably higher than that of individual cows. A mature bull may sire forty calves yearly. In fact, a bull is generally accepted as being half the herd.

The earliest method of selecting bulls was based on the animal's external characteristics, some of which had no relation to the milk yield, while others were considered to indicate the power to transmit good or poor milk yields. This system has given indifferent results. The

probability of improving a herd by a bull selected on external characteristics has been estimated to be only one in five. Yuill quotes the results of a bull-indexing investigation in South Africa, which showed that twelve of the best Friesian bulls selected on their show-ring records had reduced the production of 109 of their daughters as compared with the yield of their dams by an average of 100 gallons of milk per cow per lactation.

Later on the milk yields of the sire's dam or other female ancestors was the measure used. While this was an improvement on the show-ring records, it assumed that the bull always transmits the productive capacity of his dam to his progeny. It has been proved that the prepotency of the sire or his power to transmit the trait of high production to his daughters is of more importance than the production factor inherited from his dam. The need to ascertain the measure of prepotency of a bull led up to the establishment of bull-proving by the Index System.

The United States Department of Agriculture is mainly responsible for the large scale adoption of the "proved bull" movement. In 1919 it began a campaign for the substitution of registered sires for grade bulls. In 1924 it moved a step further and advocated the use of bulls which were not only registered sires, but also of good conformation, sons of class AA cows, and sired by "proved" bulls. Proof, then, was accepted on the yield of ten daughters. This method was abandoned in 1926, when "proof" was ascertained from a comparison of the daughters' and dams' records. In 1934 a new feature was adopted by the inclusion of the herd level as an essential factor, with the result that bulls are now classed in their order of importance in accordance with their capacity to influence the level of the herd yield. The classes are three —meritorious, mediocre, and inferior.

In Queensland, owing to the many factors operating, it is not considered desirable to accept the figures for milk and butter-fat given in any bull index as definite, but rather as a broad indication of a sire's potentialities.

As pointed out previously, the United States Department of Agriculture leads the way in the "proved bull" movement, which has now a wide application throughout that country. The dam-daughter comparison of yields was instituted in 1926.

Despite the fact that this method had been abandoned by the United States Department of Agriculture some years previously, the Jersey Cattle Club of America, in 1932, adopted the average yield of the first ten daughters as the measure of the bull's capacity. In 1934 the proving of sires was initiated by the Holstein Friesian Association of America, using the Mount Hope Index. In 1931 the Bull Index system was adopted by the Guernsey Island Cattle Club and the English Suffolk Milk Recording Society, and in 1934 by the English Guernsey Cattle Society. In Australia the Victorian United Cow Test Association commenced a bull-proving system in 1931, and in 1936 it was adopted by the Red Poll Society in Victoria.

In Denmark, according to Yuill, 300 to 400 bulls are indexed and proved annually.

The authors of this article have prepared graphs and indices of some bulls used in Queensland herds. These will be found in the following pages.

PROVING A BULL.

The greater the number of records used in indexing a bull, the truer should be the resultant index in indicating the actual value of the bull for inheritance and powers of transmission of milk and butter-fat capacity. Yuill, of Victoria, recommends that there should be at least the yields of ten daughters from at least five tested dams. The United States Department of Agriculture considers that a sire is proved if he has five or more tested daughters from tested dams. It is essential. however, that the records of the daughters used for the index should not be selected arbitrarily, as the result would not be an average and would not give a true indication of a sire's worth. In practice, an endeavour should be made to assemble the records of all daughters of the bull and their dams as far as reliable records are available for both.

SIRE PROVING AND ITS APPLICATION.

According to Taussig, the results obtained up to 1936 by the United States Department of Agriculture in its bull-indexing campaign show that of 4,309 bulls only 2,242 were considered as "proved," for the number of daughters' records of the remainder was less than five, and was therefore considered insufficient. Of the proved bulls, 52 per cent. showed a production improvement capacity, and these were divided into three classes, viz., excellent, good, and fair; 6·8 per cent. had no noticeable influence on the production of their daughters and were placed in the class "undetermined"; 41·3 per cent. of the sires had an unfavourable production and were classed as "poor." Edwards and Hunter-Smith conducted an investigation on fifty-one sires of the best herds in Great Britain, and Norwood, reporting on the results of the investigation, stated that out of fifty-one bulls tested only eight had the effect of raising production, while twenty exercised a decidedly depressing influence. The 611 daughters of the bulls covered by the test averaged about 30 gallons of milk less than their 611 dams. Bull indexing has exposed the wide differences which may exist between the transmission value of sires and which is made evident from the results obtained in Queensland, as indicated by the three graphs published on page 133.

The great economic importance of bull indexing should be obvious from the above results, and suggests the desirability of its general extension in Queensland by placing more females under tests. This would greatly broaden the scope of the application of the index. Without dam-daughter tests it is impossible to have a Bull Index. Experiments on a large scale were carried out on artificial impregnation of dairy cows by Professor Sorenson, on the Island of Samso, Denmark, from 1st September, 1936, to 31st August, 1938. In 1937-38, 97·5 per cent. of cows artificially inseminated were in calf as compared with 95 per cent. by natural service. When the technique of artificial insemination has been developed to the stage where it could be incorporated in the ordinary routine of breeding practice, bull indexing would be of great value. By its application inferior bulls could be eliminated and the germ plasms of outstanding proved sires used for the artificial insemination of widely distributed dairy herds.

There are quite a number of systems enunciated by various authorities. Some are simple; some give a distorted index by working on a system of percentages; whilst others are further complicated by providing mathematical formulæ for all contingencies. Of those last mentioned, Taussig states "they are condemned to perish in a morass of figures," and recommends a simple form which could be applied more easily and which would receive more general acceptance.

As the indices of Queensland bulls shown in the succeeding pages are based on the celebrated "Mount Hope Commercial Index" (which will be dealt with later), no good purpose would be served by discussing here other methods proposed for determining a bull's transmitting ability.

The value of any bull index is influenced by many factors operating which affect the yields of both dam and daughter and which bear no relation to heredity. The most important of these are—the age of the animals, the effect of environment, the length of dry period before commencing lactation, calving period, feeding, &c. The age influence is neutralised by means of a correction factor. The influence of the other factors, generally speaking, is lessened by the fact that the index is prepared on the yields of the greatest possible number of dam and daughter pairs, with the result that the plus and minus influences are more or less balanced.

Another reservation as to the value of bull indices pointed out by Yuill is that the production level of a cow affects the capacity of a bull to increase or reduce the yield of the daughter as compared with the dam. A cow with a low yield capacity gives the bull an opportunity to raise the standard of the daughter, whilst a cow with a high yield limits or nullifies the bull's capacity to raise the production of the daughter. The Mount Hope Index applied by Hewitt to the Friesian herd of the Victorian Department of Agriculture Research Farm at Werribee shows that—(1) this index can be applied to both bulls and cows; (2) if both sire and dam have high Mount Hope Indices, the expectancy of obtaining high-yielding animals from the bull is increased by 80 per cent.

Using bull indices as a basis, the selection of a sire is greatly simplified and the continued use of sires having a high index for production in a herd concentrates in the germ plasm the genetic factors responsible for high production.

THE BASIS OF THE BULL INDEX.

That the average yield of the daughters is approximately half-way between those of their parents is the fundamental principle on which a Bull Index is based. This has been noted by investigators in various countries, particularly where the larger breeds, such as the Red Danish, Shorthorn, and Friesian have been crossed with a small, high-testing breed like the Jersey. Not only the milk and butter-fat yields, but also the size characteristics of the daughters were about midway between the two parents. Amongst these investigators was Count Arlefledt, of Denmark, whose observations were noted in the eighties of the last century.

In 1913, Nil Hansson, a Swedish investigator, proposed the first formula based on a comparison of dam and daughter butter-fat records on the assumption that the daughter's record is the mean between the dam, whose butter-fat record was directly available, and the transmission capacity of the sire, which cannot be directly established. Woodward was the first to apply Hansson's formula to a large number of cattle, limiting himself to the transmitting capacity of the bull with respect to *butter-fat* yield only. In the same year as Hansson enunciated his formula, viz., 1913, Professor W. H. Yapp, of Illinois, formulated an index placing the daughters midway between sire and dam, but this was done only for the *milk corrected yields,* allowing 4 per cent. to represent the butter-fat yield. This became known as the "Equal Parent Index" or the "Intermediate Index." The Equal Parent Index has a great advantage over others in that it is easy to calculate. This was the first definite step towards establishing an index. Dr. Goodale, Professor of Genetics at the Massachusetts Agricultural College, was the first to *prove* that progeny of high and low test parents also group themselves midway between the level of the sires and dams. This finding is accepted as being true, not only within a breed itself, but also of the progeny of crossed parentage.

These results led up to Dr. Goodale (now of Mount Hope Farm) formulating his now famous Mount Hope Index, placing the progeny midway between the parents for both milk and butter-fat levels. Dr. Goodale has prepared his index in two forms—i.e., the "Precise" and the "Commercial." The Precise Index is involved, whilst the Commercial Index is much simpler, and as Dr. Goodale recommends the latter for herd improvement work, it is unnecessary to discuss the former here. Kenrick and McDowal, of the American Bureau of Dairy Industry, also evolved an index based on the Equal Parent basis, the results from which practically coincide with the Mount Hope Commercial Index. In the latter the milk yield is age corrected and the actual test averaged, whilst in the former the test is ignored and both the milk and butter-fat yields are age corrected, where necessary, when a final comparison of the age-corrected yields of the daughters and dams can be made. In each case the daughters are placed midway between the dam and sire.

PREPARING A BULL INDEX.

The first question is to decide how many dam-daughter pairs should be established as a minimum on which to arrive at a sire's index. This question has already been dealt with earlier. It would appear, however, that in the early stages of bull indexing in Queensland the standard used by the United States Department of Agriculture., viz., five tested daughters from five tested dams, should be the accepted minimum as most likely to meet Queensland conditions for the present.

Having calculated out the average age-corrected yields of dams and daughters, the next step is to ascertain the bull's index, based on the assumption that the average yield of the daughters represents the average yield of the dams and the potential yield of the sire. For example, if the average yield of all the dams were 350 lb. and that of the daughters 375 lb., the index of the bull would be 400 lb. As previously explained,

this is arrived at by multiplying the daughters' average yield by two and subtracting the average yield of the dams thus—

375 lb. × 2	=	750
Subtract average of dams ..	=	350
Bull's index	=	400 lb.

Another method of arriving at the bull's index is to add to, or subtract from, the average yield of the daughters, the difference in yield between daughters and dams. The difference is added to the average yield of the daughters when the average yield of the dam is lower than the daughters, and subtracted from the daughters' average yield when the dam's yield is higher. (See example, page 132.)

AGE CORRECTION FACTORS.

This subject has also been a ground for contention amongst many of the world investigators. In the case of a junior two-year-old, the factors by which the yield of the cow of that age must be multiplied in order to estimate its probable yield when mature range between 1·5 and 1·3, according to different authorities.

The basis arrived at by Turner, an early investigator, is that a two-year-old cow gives 70 per cent. of its mature yield, a three-year-old 80 per cent., and a four-year-old 90 per cent. Professor Turner's figures have been adopted in British Columbia and also in Victoria. Turner's basis is considered to be about an average of the figures of all the investigators.

Yuill, of Victoria, has prepared an age-correction ready reckoner or table of age-corrected yields based on Turner's figures, which it is proposed to use in Queensland and which is published on pages 137 and 138, in the hope that it will assist farmers and others who are interested in Bull Index work. Yuill's explanatory notes on the ready-reckoner are as follows:—"The actual junior yields are found on the left-hand side of the page, while the six columns of age-corrected figures represent the expected mature equivalent of these records at the ages shown at the head of each column. The figures in the table can be used alike for gallons of milk or pounds of butter-fat. If pounds of milk are required, these can be found by multiplying the butter-fat yield by 10. Should the more exacting worker wish to secure closer results than to the nearest 10 gallons or 10 lb. as represented by each line on the chart, he can halve this increase by merely adding 5 to the figures on the left-hand column and halving the age-corrected figures. This can be done by adding the figures shown at the foot of each column. The following illustrations explain how the chart can be used:—A junior two-year-old has produced, say, 600 gallons (6,000 lb.) milk and 240 lb. butter-fat; the age-corrected figures are shown to be 840 gallons (8,400 lb.) milk and 336 lb. butter-fat. Had the figures been 605 gallons and 245 lb. butter-fat, the final figures could be found by adding 7 to each age-corrected yield—i.e., 847 gallons (8,470 lb.) milk and 343 lb. butter-fat. The range of the figures on the table cover milk yields up to 9,000 lb. and all likely butter-fat yields above 100 lb. It is unlikely that any junior cow yields will occur outside these limits; if so, they can be multiplied out by using the factor shown at the head of each column."

After all the age-corrected records of the sire's daughters have been assembled and averaged and his mates' records have been similarly

dealt with, the butter-fat percentage for each can then be obtained by multiplying the butter-fat by 100 and dividing by the milk yield, thus—

$$\frac{\text{Butter-fat average} \times 100}{\text{milk average}} = \text{average test.}$$

The average yields and tests of the mates and daughters of the bull are now shown in comparison, and the index of the bull shown as follows:—

Index.	Milk.	Fat.	Butter-fat.
	Lb.	Per Cent.	Lb.
17 mates of registered Jersey bull (25 records reviewed), averaged	7,569	5·32	403
17 daughters of registered Jersey bull (36 records reviewed), averaged	7,279	5·57	406
	− 290	..	+ 3
Index of registered Jersey bull, 17 D-d pairs (61 records reviewed)	6,989	5·85	409

The above is the index of a bull used in a Queensland herd.

This bull raised the butter-fat yield of the herd by only 3 lb., which is really negligible, but still he proved himself to be a sire of merit because he maintained the high standard of his mates. It will be observed that the milk yield of the daughters is less than that of their dams, but the average test and butter-fat are higher. To ascertain this sire's index for butter-fat it is necessary to subtract the difference in the milk yield from the milk yield of the daughters to give the sire's milk yield index, and add the difference in the butter-fat yield to that of the daughters. It is apparent that this bull reduced the average milk yield and raised the test and butter-fat yield. Sometimes a bull will raise the milk yield and lower the butter-fat yield; in some cases a bull will raise both the milk and butter-fat yields, and in other cases he will lower both.

Graphs showing the influence of three bulls used in Queensland on their respective herds are to be seen on page 133. For obvious reasons the names of these bulls cannot be given.

Bull "A." This bull, although four of his daughters' productions were lower than their dams, raised the average milk yield, test and butter-fat of all his daughters considerably above those of their dams. He is an outstanding registered A.I.S. bull, and a herd builder with a particularly high index of 637 lb. of butter-fat. The average yield of his mates was 489 lb. of butter-fat, which was raised to 563 lb. by their daughters.

Bull "B." This bull lowered the production of five of his daughters as compared with their dams and raised the production of four daughters above that of their dams; he lowered the average production of all of his daughters by 42 lb. of butter-fat as compared with their dams. Still his daughters average 485 lb. of butter-fat and his index is 443 lb. of butter-fat, so, although he reduced the standard of a very exceptional herd (viz., 520 lb. butter-fat average), he must be considered an excellent bull, and a long way above the average. He is a registered Jersey bull.

Bull "C." This registered Jersey bull lowered the milk yield, butter-fat and test of all of his daughters below his mates, and, incidentally, the production standard of the herd. He has an index of 178 lb. of butter-fat and must be considered an inferior bull and a herd destroyer, having reduced the average butter-fat yield of his mates from 362 lb. to 270 lb. in the case of their daughters.

It can readily be seen from the above that the index becomes the "measure" of a bull, just as a production record does of a cow, and that his influence on a herd is clearly indicated in his index.

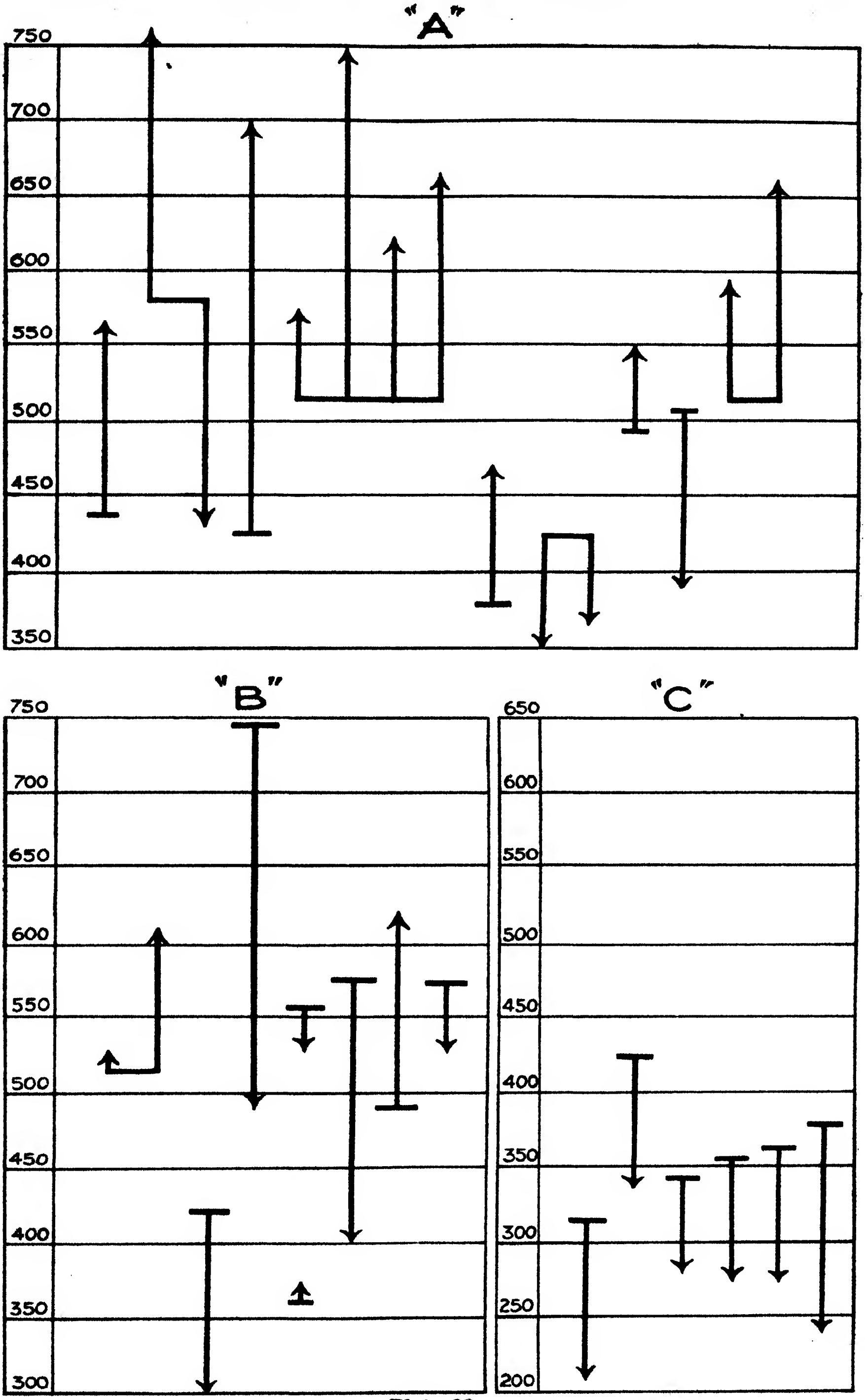


Plate 33.

[N.B.—The graphs depict the influence of the sires "A," "B," and "C." The arrow denotes the age-corrected production of a daughter, while the short horizontal line shows the production of the dam. If there are two or more vertical lines joined by a single horizontal line the arrows show the yields of two or more daughters of any dam. The figures represent the butter-fat yield in lb.]

HOW TO PREPARE ONE DAM-DAUGHTER PAIR, "ROSE" AND HER DAUGHTER "ROSY."

Age.	Dam.	Dam's Actual Yields.		Age Corrected Figures.		Age.	Daughter.	Daughter's Actual Yields.		Age Corrected Yields.	
		Milk.	Butter-fat.	Milk.	Butter-fat.			Milk.	Butter-fat.	Milk.	Butter-fat.
Yrs.		Lb.	Lb.	Lb.	Lb.	Yrs.		Lb.	Lb.	Lb.	Lb.
4½	Rose ..	8,413	427	9,085	460	2	Rosy ..	6,151	336	8,611	470
6	Rose ..	8,080	512	8,080	512	2½	Rosy ..	7,978	449	10,371	583
9	Rose ..	7,797	387	7,797	387	3½	Rosy ..	9,628	568	11,553	681
						4½	Rosy ..	9,401	545	10,435	605
						6	Rosy ..	9,857	510	9,857	510
						7	Rosy ..	7,410	353	7,410	353
						8	Rosy ..	8,260	401	8,260	401
						9	Rosy ..	9,424	589	9,424	589
				24,961	1,359					75,921	4,192
Average of one age-corrected and and two mature yields ..				8,320	453	Average of four age-corrected and four mature yields ..				9,490	524

[These are actual yields of a dam and her daughter in a Queensland herd; fictitious names have been substituted.]

NOTE.—*All dam-daughter pairs* should be arranged as above, so that an individual comparison of all age-corrected records can be made.

Having completed the age-correcting stage for each dam-daughter pair, a comparative list is made as shown below:—

REGISTERED JERSEY BULL.

Mates of Registered Jersey Bull.					Daughters of Registered Jersey Bull.				
Records Averaged.	Mates.	Age Corrected Yields.			Records Averaged.	Daughters.	Age Corrected Yields.		
		Milk.	Test.	Butter-fat.			Milk.	Test.	Butter-fat.
		Lb.	Per cent.	Lb.			Lb.	Per cent.	Lb.
3	Rose	8,320	..	453	8	Rosy ..	9,490	..	524
1	Gentle ..	6,925	..	379	1	Duchess ..	9,534	..	551
3	Roseland ..	8,320	..	453	6	Rosalie ..	8,334	..	491
3	Tottie.. ..	8,703	..	529	1	Lottie ..	6,487	..	423
3	Tottie ..	8,703	..	529	1	Princess ..	4,905	..	375
1	Etta ..	5,370	..	270	1	Ethel ..	4,622	..	243
1	Ettme ..	5,762	..	336	1	Kate ..	5,084	..	235
1	Dolly ..	8,412	..	416	1	Polly ..	6,571	..	277
1	Victoria ..	6,816	..	391	1	Victory ..	7,595	..	439
2	Queen ..	7,263	..	341	1	Mary ..	6,370	..	379
1	Canary ..	7,957	..	408	1	Choice ..	6,749	..	396
1	Sultana ..	7,050	..	371	3	Majesty ..	10,749	..	577
1	Fern ..	7,251	..	387	2	Success ..	7,745	..	425
1	Lady ..	7,262	..	357	2	Scotia ..	8,135	..	460
2	Starlight ..	9,191	..	496	3	Moonlight ..	8,581	..	433
1	Blonde ..	6,398	..	303	2	Brunette ..	6,814	..	370
1	Eileen ..	8,985	..	446	1	Noreen ..	5,986	..	318
27		128,688	5·32	6,865	..		123,751	5·57	6,911
Average yield of all mates		7,569	5·32	403	Average yield of all daughters ..		7,279	5·57	406

[In working out the index of a Queensland Jersey bull the above figures were actually obtained, but fictitious names have been substituted.]

THE TRUE MEASURE OF A BULL'S VALUE.

Bull Index or Yield of Daughters?

Notwithstanding the general acceptance throughout the dairying world of the Bull Index as the measure of a bull's powers of tranmission of productive qualities, there are still many who cling to the average yield of the bull's daughters as the true measure.

1A.	Milk.	Fat.	Butter-fat.
	Lb.	Per cent.	Lb.
29 mates of registered Jersey bull (43 records reviewed), averaged	7,277	5·73	417
29 daughters of registered Jersey bull (43 records reviewed), averaged	8,291	5·19	430
	+1,014	..	+13
Index of registered Jersey bull, 29 D-d pairs (86 records reviewed)	9,105	4·86	443

2A.	Milk.	Fat.	Butter-fat.
	Lb.	Per cent.	Lb.
9 mates of registered Jersey bull (10 records reviewed), averaged	9,162	5·75	527
9 daughters of registered Jersey bull (17 records reviewed), averaged	8,264	5·86	485
	− 898	..	−42
Index of registered Jersey bull, 9 D-d pairs (27 records reviewed)	7,366	6·01	443

A comparison of the Indices of Registered Jersey bulls 1A and 2A clearly shows the fallacy of that view.

By a remarkable coincidence both of these bulls have exactly the same butter-fat index., viz., 443 lb., but the variations otherwise are surprising. Bull 2A reduced his daughter's average milk yield by 898 lb. and their average butter-fat yield by 42 lb. as compared with their dams, but he raised the average test of his daughters.

Bull 1A raised the average milk yield of his daughters by 1,014 lb. and also their butter-fat by 13 lb. as compared with their dams, but he reduced their test. The impression might be gathered from those performances that bull 1A was the better bull, whereas they had exactly the same value as far as butter-fat yield was concerned, viz., 443 lb. Again the average butter-fat yield of the daughters of bull 2A was 485 lb. and that of bull 1A was only 430 lb. Judged by the standard of his daughters, bull 2A was superior because his daughters' recorded average was 55 lb. of butter-fat more than the daughters of bull 1A, when, as a matter of fact, they were both equal. These illusions arise from the fact that bull 2A was mated with cows whose average butter production was 527 lb. and bull 1A with cows whose average butter-fat production was 417 lb., a difference of 110 lb., which was reflected in their daughters' records. That these false impressions were held by practical stud herd

breeders is proved by actual facts. Bull 1A, having raised the production yield of his daughters compared with their dams, was eagerly sought after and finally purchased by another stud breeder at a good price, whilst bull 2A having reduced the production yield of his daughters compared with their dams, which had an exceptionally high average of production yield, was discarded and sold for a comparatively small sum to a farmer with a grade herd. Had bull indexing been in operation at the time he would never have been used outside a stud herd, for besides having a high butter-fat index he is one of the most fashionably-bred bulls in Queensland. It should be abundantly clear from the above that the average yield of a bull's daughters is *not* his true measure. The index of the bull arrived at after a comparison of the daughters' and dams' yields is his true value to the herd he enters.

PRODUCTION RECORDING IN QUEENSLAND.

The testing of animals for the advanced register follows on broad lines the principles set out in the rules of the Australian Pure Bred Dairy Cattle Production Recording Scheme. Under the scheme the animals tested are registered purebreds. They are identified by the tattoo mark by the Government official who carries out the weighing, sampling, and testing of the milk after supervising the milking. The production is estimated from the results of five twenty-four hour tests, taken at specified intervals over a lactation period of 273 days. Allowing five days after calving for the animal to return to normal, the first test is then taken thirty-three days later, and the remaining four at intervals of sixty days. From the results of the twenty-four hour test the yield of the milk and butter-fat for the 273 days is calculated. These are recorded under the names of the herd owners, and under the name of each sire a record is kept of the yields made by his daughters during their various lactations.

SELECTION OF A DAIRY SIRE.

In the selection of a young dairy bull, it is first of all necessary to consider the pedigree, the index of his sire and grandsire, the butter-fat test of his dam and granddam, and his own individuality. The intelligent use of bull indexing can play a role of major importance in the improvement of dairy herds if the young bull is indexed as soon as he has five tested daughters from five tested dams, thus giving an early indication of his prepotency value. In the selection of a mature bull, it would be advisable to secure one which has qualified through his mates and daughters for an index, so that through his index his value can be readily assessed.

LITERATURE CONSULTED.

In the preparation of this article free use was made of the available published literature on bull indexing, and in particular the work of S. Taussig, "The Problem of Proving Dairy Bulls," International Review of Agriculture, Rome, March, 1937, pp. 69T-81T, and W. J. Yuill, "Bull Indexing: New Methods Replace Old Ideas," Journal of the Department of Agriculture, Victoria. Melbourne, December, 1936, pp. 633-641.

TABLE OF AGE-CORRECTED MILK AND BUTTER-FAT YIELDS FOR USE IN BULL INDEX WORK.

The figures of the left-hand column represent the actual yields of a junior cow; those in the age-corrected columns are anticipated mature yields made by junior cows of the age shown at the head of each column, together with the correcting factor for each age. By adding a "0" to the gallon, yields can be converted into lb. of milk.

This column represents a junior cow's yield. The figures can be used for gallons of milk or 1 lb. butter fat.	Age at Beginning of Lactation and Correction Factors for Each Age.					
	2 years.	2½ years.	3 years.	3½ years.	4 years.	4½ years.
	1·4	1·3	1·25	1·2	1·11	1·08
	Age-Corrected Mature Yields.					
100	140	130	125	120	111	108
110	154	143	137	132	122	118
120	168	156	150	144	133	129
130	182	169	162	156	144	140
140	196	182	175	168	155	151
150	210	195	187	180	166	162
160	224	208	200	192	177	172
170	238	221	212	204	188	183
180	252	234	225	216	199	194
190	266	247	237	228	210	205
200	280	260	250	240	222	216
210	294	273	262	252	233	226
220	308	286	275	264	244	237
230	322	299	287	276	255	248
240	336	312	300	288	266	259
250	350	325	312	300	277	270
260	364	338	325	312	288	280
270	378	351	337	324	299	291
280	392	364	350	336	310	302
290	406	377	362	348	321	313
300	420	390	375	360	333	324
310	434	403	387	372	344	334
320	448	416	400	384	355	345
330	462	429	412	396	366	356
340	476	442	425	408	377	367
350	490	455	437	420	388	378
360	504	468	450	432	399	388
370	518	481	462	444	410	399
380	532	494	475	456	421	410
390	546	507	487	468	432	421
400	560	520	500	480	444	432
410	574	533	512	492	455	442
420	588	546	525	504	466	453
430	602	559	537	516	477	464
440	616	572	550	528	488	475
450	630	585	562	540	499	486
460	644	598	575	552	510	496
470	658	611	587	564	521	507
480	672	624	600	576	532	518
490	686	637	612	588	543	529
500	700	650	625	600	555	540
510	714	663	637	612	566	550
520	728	676	650	624	577	561
530	742	689	662	636	588	572
540	756	702	675	648	599	583
550	770	715	687	660	610	594
560	784	728	700	672	621	604
570	798	741	712	684	632	615
580	812	754	725	696	643	626
590	826	767	737	708	654	637
600	840	780	750	720	666	642
610	854	793	762	732	677	658

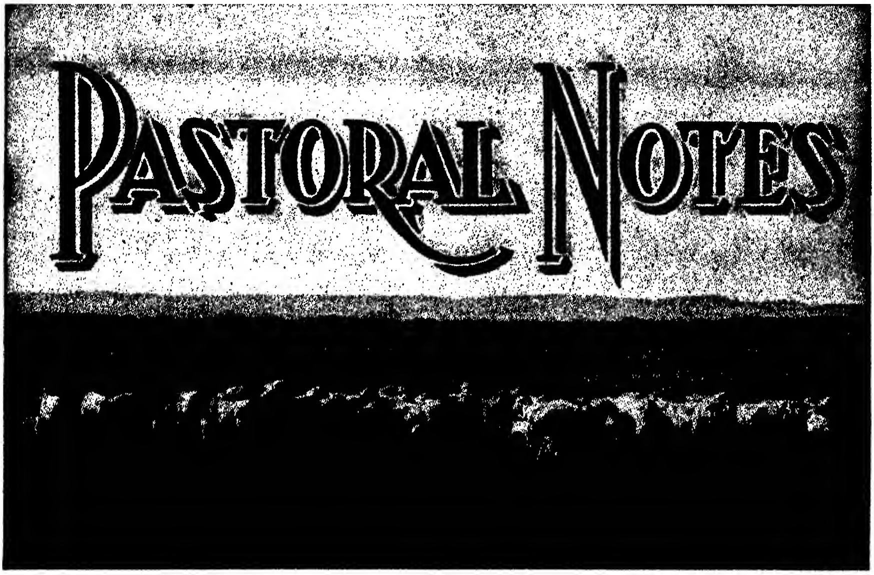
This column represents a junior cow's yield. The figures can be used for gallons of milk or 1 lb. butter fat.	Age at Beginning of Lactation and Correction Factors for Each Age.					
	2 years.	2½ years.	3 years.	3½ years.	4 years.	4½ years.
	1·4	1·3	1·25	1·2	1·11	1·08
	AGE-CORRECTED MATURE YIELDS—*continued.*					
620	868	806	775	744	680	669
630	882	819	787	756	699	680
640	896	832	800	768	710	691
650	910	845	812	780	721	702
660	924	858	825	792	732	712
670	938	871	837	804	743	723
680	952	884	850	816	754	734
690	966	897	862	828	765	745
700	980	910	875	840	777	756
710	994	923	887	852	788	766
720	1,008	936	900	864	799	777
730	1,022	949	912	876	810	788
740	1,036	962	925	888	821	799
750	1,050	975	937	900	832	810
760	1,064	988	950	912	843	820
770	1,078	1,001	962	924	854	831
780	1,092	1,014	975	936	865	842
790	1,106	1,027	987	948	876	853
800	1,120	1,040	1,000	960	888	864
810	1,134	1,053	1,012	972	899	874
820	1,148	1,066	1,025	984	910	885
830	1,162	1,079	1,037	996	921	896
840	1,176	1,092	1,050	1,008	932	907
850	1,190	1,105	1,062	1,020	943	918
860	1,204	1,118	1,075	1,032	954	928
870	1,218	1,131	1,087	1,044	965	939
880	1,233	1,144	1,100	1,056	976	950
890	1,246	1,157	1,112	1,068	987	961
900	1,260	1,170	1,125	1,080	999	972
5	7	6·5	6·25	6	5·5	5·4

"TICK WASHING" CALVES AND ITS RELATION TO TICK FEVER.

Young cattle possess a natural resistance to tick fever, but this gradually grows weaker until at the age of twelve months for all practical purposes it ceases to exist. The foregoing applies to calves reared in clean areas and also (and this is the important point) to calves reared in ticky areas if such calves are sprayed so often and so regularly as to keep them entirely or almost entirely free of ticks. Under such conditions, the resistance to tick fever of calves in ticky areas at the age of twelve months will be little better than that of calves reared in clean areas.

The matter is worthy of close attention, as some farmers definitely overdo the treatment of calves for tick infestations. The belief is, of course, that the growth rate of the calves will be increased and their general wellbeing bettered, but, although this is true enough, it is, notwithstanding, a dangerous course to pursue, as mortality from tick fever is likely to follow at the age of eighteen months to two years or older.

Calves should be allowed to carry a reasonable number of ticks from a few weeks old onwards. In this way their natural resistance to tick fever will be continually reinforced, so to speak, so that at the age of twelve months it will be just as strong as it was during the first few weeks of life. In normal circumstances, this resistance will, if the animal is continually exposed to moderate numbers of ticks, be retained throughout life.



The Small Sheep Property.

WHEN money is available a small grazing selection frequently carries improvements fit for a much larger property. On the other hand, when money is scarce, the small holding often lacks even the bare improvements essential to the wellbeing of the sheep and the handling of the clip.

A property has a certain capital value, and unnecessary improvements merely mean over-capitalisation. Interest has either to be paid or allowed for this excess expenditure.

However, certain improvements are necessary in all cases.

A substantial boundary fence is essential, and, should the district be dingo-infested, netting and top netting are also necessary.

Next in importance is the water supply. If there is adequate natural water, the selector is fortunate. Failing natural water, wells, sub-artesian bores, surface tanks, or bore drains to conduct supplies from neighbouring bores must be provided. The type of watering facilities to be used is essentially a matter of economics. What pays best, particularly in drought emergencies, should be a guiding principle in the grazier's choice.

A horse paddock and yards for the handy working of house cows are among the first provisions to be made. This paddock should be handily situated to the homestead and should contain water.

Subdividing of the property for the convenient working of sheep is seldom given sufficient thought. It involves, not only the running of fence lines, but their construction in such a way that water is easily and continuously available to the stock. The fences should be substantially erected to obviate continuous drafting and boxing. Too much money may be spent in wrongly thought-out subdivisions, but, generally, the smaller the paddocks the better. The posts used for fencing should be of timbers proved in the district for their durability.

On a small holding, the shearing shed and drafting yards may be close together. The shed should be well constructed and properly designed, but not larger than necessary for the competent handling of the numbers of sheep ordinarily run on the property. The yards also should be constructed substantially, and their correct design for the drafting of sheep is of first importance. Where shed and yards are together, the latter should be so placed that the shed can be conveniently filled with woolly sheep.

The situation of the homestead should permit the easy working of the property, and its cost should be no greater than the improved value of the holding warrants.

DIPPING SHEEP.

Dipping is the only successful method of freeing the flock from lice and ked. For dipping, a recognised proprietary material should be chosen and the directions for mixing followed implicitly.

Ordinarily, dipping should be done within a month after shearing, but not before all cuts or wounds have healed. A fine day should be chosen for the job. Extremes of heat or cold should be avoided.

Sheep should never be dipped when in a heated state. Yard them, if possible, the night before.

Immerse the sheep completely. Allow them to drain and, if possible, dry in the shade. Avoid driving them long distances to paddocks after dipping.

Dipping pays, and, in addition, gives some protection against the blowfly.

CRUTCHING AND JETTING SHEEP.

There is often controversy as to whether crutching or jetting is the better method of combating blowfly attack. There should be no argument on this score, for, with the increasing severity of fly invasion, both methods have their place in the protection of the flock.

There is a school of thought which insists that the wool should be left on the crutch of the sheep and jetting alone resorted to. Other graziers pin their faith to crutching and will not consider jetting.

It is thought that, singly, either of these methods may be unsatisfactory to some extent, inasmuch as both methods should be used in conjunction. To get the greatest immunity from fly strike, the grazier is advised to carefully crutch when—or before if practicable—the first fly invasion is likely to occur. This should give the flocks immunity for about two months. Should further treatment then be necessary, jetting the previously crutched sheep is advised. Thus, with the intelligent combination of the two methods, reasonable protection should be assured.

SHEEP DRENCHING.

Reports have been received from sheep owners at various times of ill-effects following the use of the nicotine sulphate and bluestone drench, which is advised for the removal of hair worms from sheep. This drench is perfectly safe providing the sheep owner knows when and how to use it. Where it is followed by ill-effects these are usually due to—

1. *Careless Mixing.*—Nicotine sulphate is a highly poisonous drug, therefore the mixing of the drench should be given every care. The nicotine sulphate is measured in fluid ounces and not in ounces weight.
2. *Careless Administration.*—The majority of ill-effects which have followed the use of this drench are due to careless administration. The dose given depends, not only upon the age, but also upon the condition of the sheep. The recommended doses are for sheep of various ages in fair to good condition. If the condition of the sheep is low, the dose should be reduced about one-fourth.

   If the drenching is hurried, a portion of the fluid may enter the lungs of the animal with fatal results. It requires only a very small quantity of nicotine sulphate to kill a sheep should it reach the lungs. In hurried drenching, which is most frequently the case where automatic drenching guns are used, the tissues of the mouth and throat may become cut or bruised. The nicotine sulphate is rapidly absorbed through these wounds with frequently disastrous results.

While the nicotine sulphate and bluestone drench is highly effective against stomach worm, it should not be employed where a heavy stomach worm infestation is present. Under such circumstances this drench becomes dangerous, as it may be rapidly absorbed into the body.

In sheep which are suffering from stomach worms, bluestone alone should be used.

It is always wise before drenching a flock to ascertain which species of worm is responsible. This can be readily determined by killing and examining one of the most affected sheep.

A LAMB-MARKING AND BLOWFLY SPECIFIC.

A lamb-marking and blowfly specific should be an antiseptic as well as a healing agent, and, besides killing the maggots present, it should give some protection to the sheep or lambs against maggots developing from a future strike and should be easily washed from the wool during the scouring.

A mixture recommended for use is made up as follows:—40 per cent. Shell dieselene oil or Vacuum 28-38 fuel oil; 55 per cent. fish, herring, or cod oil; 5 per cent. cresylic acid; and 0·1 per cent. sodium arsenite, or 1 lb. to 100 gallons.

For convenience in making 5 gallons of the mixture, take 22 pints fish oil, 16 pints fuel oil (not more than 875 specific gravity), 2 pints cresylic acid, and 1 oz. sodium arsenite.

To Mix.—Place the fish oil in a 5-gallon drum and add the sodium arsenite; shake well, and then add the cresylic acid and fuel oil. Should the weather be cold, heat at least some of the fish oil, and add the sodium arsenite and shake to secure a good suspension, and then add the other ingredients as above. The mixture should be well shaken before using, and shaken up occasionally to keep the sodium arsenite in suspension while in use. Apply with a clean brush or swab. In purchasing in quantities to make 100 gallons of the specific, the approximate price per gallon, including the container, has worked out at 3s.

RIGHT TYPE OF EWES FOR LAMB RAISING.

If merino ewes form the mother flock, the fat lamb raiser is handicapped in the matter of profitable weights at an early age, or, in other words, early maturity.

The ewe most suitable for the production of early maturing sucker lambs for export is got by the use of rams of one of the long-woolled breeds—such as the Romney Marsh, Border Leicester, or Lincoln—on the strongest, boldest type of merino ewe procurable. The ewe lambs from the resultant drop should be retained as the future breeding flock.

Pure-bred Corriedale ewes also are recommended as dams in a fat lamb raising flock.

On either type of ewe a Downs ram—such as the Southdown or Dorset Horn—should be used.

The ewe flock should be maintained in good strong store condition until lambing time. After lambing, no feed is too good for the ewe and lamb.

Under favourable conditions, fat lambs should be marketed at four months of age.

FAULTY SKIRTING.

A fault altogether too common, in the get-up of our clips, is faulty skirting. The work of skirting and rolling is, of course, under the direction of the classer and the responsibility is his. However, the actual work is very often done by inexperienced hands who are prone to treat every fleece in the same manner.

In the case of a free wool, there should be a definite reason for every piece of wool removed from the fleece. Frequently one comes across a line of wool in which the pieces and brokens exceed the fleece. When handling a free wool this proportion is very much too great. From a financial point of view, the grower is losing in actual money the difference between the prices of the pieces and brokens and the fleece wool for every pound of wool unnecessarily removed from the fleece.

Even a greater mistake is sometimes made in the case of a seedy line. This error consists of very heavy skirting in an endeavour to make a free line. Actually the very opposite should be practised—that is, the skirting should be as light as possible and the fleece wool prepared for market as a seedy line.

The wool from every flock shorn should be carefully examined and instructions given to the woolrollers as to what should be removed.

Indiscriminate skirting loses money.

ROTATIONAL GRAZING.

The practice of grazing paddocks throughout the year according to a pre-arranged plan of rotation—although highly successful in countries with a reliable rainfall—is not practicable, as a general rule, in Queensland. The main object of rotational grazing—the regular provision of short young grass—can, however, be achieved as far as weather conditions will permit by submitting each paddock to short and intermittent grazings, rather than to continuous grazing. In order that this practice of intermittent grazing may be applied in an efficient way, it is necessary to subdivide a fairly large number of paddocks, each of which may be grazed down by the available stock within a short period and then rested.

Broadly speaking, the system of management recommended for dairy pastures is to concentrate the producing stock on a paddock of young, leafy pasture for a few days, and when it has been eaten down fairly closely, transfer the stock to another paddock of young grass; and so on, coming back to the first paddock some weeks later, when good feed is again available on it.

Since the pasture in different paddocks may vary in its rate of growth, no definite orderly rotation may be possible, but each paddock may be grazed and spelled intermittently.

In selecting grasses, attention must be given to their adaptability to local conditions, period of growth and production, nutritive value, palatability, and suitability for grazing and hay making. The length of the grazing season is increased and the returns improved by the use of top dressing. Its practicability depends on the increased returns in terms of cash.

Rotational grazing does not involve so great an outlay, and is more a matter of pasture improvement by ensuring the economical use of herbage. The subdivision of holdings to provide rotational grazing appears to offer a ready means of immediate benefit through pasture management. And now is the time to act. It will be too late to achieve any advantage if it is left to make a start when the season turns dry.

HEREDITY IN SHEEP.

None of the domestic animals responds quicker to careful breeding than the sheep.

It may be taken, with some exceptions, admittedly, that like begets like—hence the importance of what is called prepotency in the sire. This power is especially important in the merino, when it is estimated that fully 80 per cent. of the animal's qualities are in the fleece.

To the careful student of breeding, prepotency in the sire is chiefly indicated in the head. This must be entirely masculine, with a bold eye, strong horn, well sprung, and with the head and neck well let into the shoulders. No matter how well a ram is covered, if the head is wrong disappointment usually follows his use in the stud.

The quality, conformation, and constitution of the ewes, too, is of great importance, and it is in the successful ''nicking'' of the sexes that the truly great studmaster shows that inherent gift which is born with him.

CROSSBRED EWES FOR FAT LAMBS.

As 98 per cent. of the sheep population of the State are of the merino breed, Queensland farmers are obviously at some disadvantage in respect of the right type of ewe for the production of the early maturing spring lambs.

In this connection, fat lamb-raisers, who are using long wool rams—such as Romney Marsh, Border Leicester, or Lincoln—should, in their own interests, retain some, at least, of the ewe drop as future breeders in their flocks.

There is no doubt that from a strict money point of view such a practice would pay. While the cry is always that crossbred ewes of the right type are either expensive or unprocurable, year in and year out ewe lambs are slaughtered in Queensland, which, if kept for breeding purposes, would have a most beneficial effect on fat lamb production. If farmers are not in a position to hold all the ewe drop from the long wools, they should, at least, retain some proportion each year with the idea of eventually working into a crossbred flock.

Control of Dairy Temperatures.

TEMPERATURES on the average farm sometimes present a difficult problem, but good dairy management depends largely on their regulation and control. The removal of animal heat from milk and cream as soon as possible after milking or separating, followed by storage in cool surroundings, will greatly lengthen their useful life by delaying the growth and development of bacteria. Together with straining, which serves to remove the visible dirt and so reduce the numbers of micro-organisms, control of temperature forms a method whereby the farmer can definitely increase the value of his product.

Straining.—Cow hairs, flies, dust, and dung particles and other foreign matter carry with them enormous numbers of bacteria, and should be kept out of milk by every possible means, for no amount of straining can remove bacteria once they have become free in the milk. Should some visible dirt gain entrance, however, the straining of each cow's milk through a cotton-wool disc immediately after milking will minimise the damage caused.

Straining should be done once only, and should take place before cooling or separating. The disc type strainer prescribed by the Dairy Regulations is preferable to any other, since each disc is discarded after use; provided that the metal parts are scrubbed and sterilized, there is no risk of recontaminating the milk as with a cloth which has not received thorough washing and boiling; also, the finer mesh of the wad will trap smaller particles than will a cloth. If a large quantity of sediment is being removed, the disc should be changed during milking.

Cooling.—Some form of cooling is necessary to counteract rapid bacterial development; and the most usual medium for the purpose is water. Adequate water is necessary for cooling, and if the supply is insufficiently cold an evaporating device or the use of ice may be required to bring the temperature of the cooled milk to 60 deg. Fahr. or lower, and cream to 70 deg. Fahr. or lower. If deep well water is available the maximum advantage in temperature can be obtained by pumping it direct to the cooler or trough when required. In the case of shallow well, surface, or tank water, some means of storing it, protected from the heat of the sun, must be devised if it is to be useful as a cooling agent.

An insulated tank, through which cold water flows and in which cream cans may be placed, is a fairly satisfactory arrangement for reducing the temperature steadily with constant stirring, which also aerates the cream; the water is then run to a trough for watering stock.

For cooling and aerating milk, the best type of cooler is the endless corrugated type, which can be used in conjunction with a water-bag evaporator (filled after each cooling in preparation for the next), or with a fixed tank to which water is pumped and flows through the cooler by gravity, or with a refrigerating unit using

brine. Such a cooler, having wide corrugations and no end plates, can be easily cleaned with a brush and has no awkward crevices. Porous cylindrical containers, large enough to hold a single can, working on the evaporation principle, are being used in some districts successfully, and have the advantage of being transportable and economical of water.

Refrigerating is a sure and certain way of improving quality, for although it actually does not kill harmful bacteria, it renders them dormant and unable to cause deterioration of milk or cream. Many farmers are coming to the conclusion that the improvement in grade resulting from refrigerating their product on the farm makes it financially economical. Very little bacterial growth takes place below 45 deg. Fahr., but the growth rate of the common milk types increases steadily above this, up to around 100 deg. Fahr., and is, of course, favoured by summer conditions. During sultry weather especially, extra care and precautions need to be taken with regard to cooling and cool storage of milk and cream.

Storage.—The Dairy Regulations provide for a suitable storage room for milk and cream, or for milk only a well-covered, ventilated stand will suffice. A clean wet bag wrapped around a can will assist cool storage by insulation and by evaporation. Direct summer sunshine in Queensland has tremendous heating power, and the proper protection of cream left adjacent to the road awaiting the carrier is, therefore, also important. Thick timber roofing over the cream stand affords greater protection than galvanised iron, which is not permitted under the Dairy Regulations.

Careful temperature control right from the start is the key to safeguarding quality in either milk or cream production, for whatever purpose they may be required.

COWS CALVING AT SHOW TIME.

Competitors in dairy classes arrange usually for the calving of individual cows about show time, so that they may be brought before the judge with all their characteristics of production strongly in evidence.

Should calving be delayed until the show is in full progress, the noise and consequent excitement may cause the continuance of labour pains, although weakly, for many hours, thus exhausting the cow and, perhaps, endangering the life of a valuable calf. In these cases, it is advisable to seclude the cow in a quiet part of the building, where there is no traffic, where curious visitors may be excluded, and where any attention required may be given only by her regular attendant. In these surroundings the cow soon settles down, the pains become strong and effective, and the calf is born without any trouble.

Immediately the calf is dropped, it is advisable to tie the navel string, close to the belly, with strong thread or silk, which has previously been soaked in a suitable disinfectant, and to paint the part with strong tincture of iodine. Neglect of this precaution may allow the entrance of infection leading to fatal disease.

The calf should receive for the first few days all it will drink of its mother's milk, as the colostrum it contains acts as a laxative, removing offensive material from the bowels, and is essential to the future wellbeing of the calf.

If the cow has been subjected to great excitement through travel and strange surroundings, the first milk she yields should be discarded, for such milk may cause digestive disorder leading on to fatal diarrhœa. It is safe to feed the second and subsequent milkings to the calf.

WHOLESOME MILK.

Normal milk can only be produced by a normally healthy herd, fed on wholesome and non-taint producing fodders. If only one cow in the herd is not in normal health her milk production will be sub-normal, and, if mixed with the milk from the remainder of the herd, the quality of the whole may be seriously affected. Cleanliness should be exercised during the whole process of milking, and all utensils and surroundings kept clean.

If the milk is intended for human consumption, cooling and aerating will allow the feed flavours to be given off, and the reduction in temperature will check bacterial development.

A WELL-BUILT DAIRY HOUSE.

The cream house illustrated is erected on the property of Mr. W. G. Cope, Biloela, to the design of A. Lebsanft, manager of the Port Curtis Co-operative Dairy Association, Biloela.

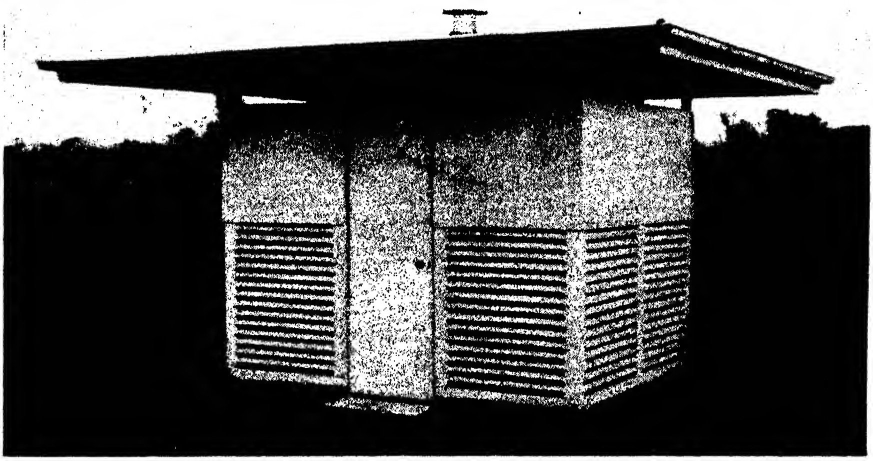


Plate 34.

The building is designed to afford better ventilation than is provided in the standard type dairy house. This is effected by the combination of louvres, ½-in. netting, and ventilator. The insulated roof and caneite walls are effective protection against the heat of the sun. The louvres completely exclude the sun's rays.

Specifications are as follows:—

Floor Area.—10 ft. by 8 ft.

Walls.—8 ft. high, consisting of louvres 3 ft. 6 in, Caneite 3 ft. 6 in., and ½-in. mesh netting 1 ft.

The Roof.—Overhangs the walls by 3 ft. and thus provides shade during the hot part of the day. Within the walls it is ceiled with T. and G. pine. The space between ceiling and roof is filled with sawdust. A ventilator is fitted in the centre of roof.

SOUND DAIRY PRACTICE.

Some dairy farmers—especially some who have only recently established dairy herds—are often unaware of the essential points for the satisfactory and cleanly production of milk and cream.

The bacteria responsible for the spoilage of milk and cream are to be found in large numbers on the farm, and if careful methods are not used they may enter from any or all of the following sources:—

(*a*) The udder, if the animal is not absolutely healthy, and if foremilk is not discarded.

(*b*) The cow's coat and skin, if not groomed before milking.

(*c*) Dust in the cowbail or dairy.

(*d*) The milker's hands, clothes, or person.

(*e*) Milk buckets and equipment imperfectly cleaned or not sterilised.

The health of the cow is, of course, of first importance, and the farmer must assure himself that every animal in his herd from which milk is being produced is in fit condition and free of any signs of disease.

Grooming the Cow.—Some preparation of the cow before commencing to milk is necessary in wet weather to remove the mud and dung splashed on the udder and teats, and, under summer or drought conditions, the dried dust, which is equally dangerous to milk quality.

The flanks and tails should be kept free from caked mud and dung by the occasional use of a currycomb, and the dust removed as often as necessary by grooming with a stiff brush dipped in clean water. It is a common practice on "model" farms to keep the hair on the flanks as well as the udder clipped short to avoid the collection of dust and dirt. Occasional clipping and regular grooming will make the daily routine of keeping the udder clean a very simple task. It is only when cows have been neglected that the washing of udder and flanks takes any length of time.

The udder and teats should be washed before each milking. This is best done with a cloth (preferably of the woven type) kept for the purpose, and a bucket of clean water, using a separate cloth, with a second lot of clean water if necessary, for finishing off the udder. A small amount of potassium permanganate (Condy's crystals) or some chlorine compound added to the water is an extra precaution observed by many farmers, which is advisable if there are any cases of sore teats, or where the water used is of doubtful purity. The teats are left damp, but not dripping, so that any remaining dust or loose hairs will adhere to the surface and not fall into the milk. Udder cloths must be washed out and boiled every day, otherwise they become a dangerous source of bacteria, and the object of washing the udder will be defeated. Both cloths and bucket should not be used for any other purpose.

With practice, this routine preparation of the cow for milking can be very quickly and yet thoroughly carried out. It can be done by a boy, and the time spent—one minute or less per cow—is negligible compared with the reduction in the number of bacteria gaining entrance to the milk and cream from this source.

COW'S AGE—EFFECT ON MILK.

How does the age of a cow influence the composition of milk? This is a question often asked. From the dairyman's point of view the fat is the most important constituent, and much experimental work has been carried out to determine how the fat test varies with the age of the cow. It has been shown that, with advancing years, cows produce milk containing a diminishing percentage of fat. The variation observed is not of any serious consequence, but it is nevertheless noticeable when average figures are taken. A cow of a high testing breed which shows an average test of 5 per cent. of fat as a young animal will decline to about 4.5 per cent. if she continues to produce to fourteen years of age.

It is sometimes thought that a heifer showing a low test as a two-year-old may improve as she matures. There are no grounds for such a belief, and any farmer building up hopes of this nature is likely to be very disappointed. The richness of milk is a matter of inheritance, and so far as is known nothing can be done to change it in an individual animal.

An interesting feature with this work is that mathematicians have taken an interest in it, and one man has actually worked out a formula for calculating the fat test for any specified age, provided that the average test for the first milking period is known.

The effect of age on the other constituents of milk has also been studied, and there is a decrease, with age, in all constituents except albumen, which increases slightly from year to year.

The effect of age on the fat test (richness) of milk should not be confused with the effect of age on milk production. There is a gradual increase in the quantity of milk produced from year to year until a maximum period is reached, after which the production figures show a slow decline. The age of maximum milk production for most breeds has been shown to be eight or nine years.

Meatmeal for Pigs.

IT is known generally that meatmeal is a good substitute for separated milk in the pig's diet, but unless it is used carefully meatmeal may prove an expensive food.

Meatmeal, which is a by-product or abattoirs and meatworks, is sold under several trade names and some varieties contain a small percentage of bonemeal. It is a wholesome food, convenient to use.

As meatmeal is expensive in comparison with pig foods grown on the farm, it should not be used more freely than is necessary.

Separated milk, which meatmeal replaces, is used according to its availability, pigs sometimes receiving milk as their sole diet, but pigs will thrive on small quantities of milk used in combination with grain and other foods such as pumpkins and sweet potatoes; the milk supplies a part of the protein necessary to balance the ration. Each pig from weaning until baconer stage and each dry sow should receive a minimum of three-quarters of a gallon of separated milk daily, and each sow with a litter, double that quantity.

When these minimum quantities of separated milk are not available, meatmeal may be substituted, using about ½ lb. of meatmeal to replace each three-quarters of a gallon of separated milk.

Pigs thrive on a mixture of milk and meatmeal, or meatmeal alone, as the protein-rich portion of the diet. The quantities used should not exceed from ¼ to ½ lb. daily per pig from weaning to baconer stage, according as to whether good lucerne is available or not; and ½ lb. for each dry sow and 1 lb. daily for each sow with litter.

By feeding a constant quantity of separated milk or meatmeal, and increasing the grain and other foods according to the pig's appetite, the nutritive ratio is widened automatically as the pig grows and satisfies its requirements.

In cases where pigs have access to good young pasture or green crops, the minimum quantity of separated milk or meatmeal stated above may be reduced by up to 50 per cent., depending on the quality of the green foods.

Meatmeal may be fed dry or mixed with milk or water.

CASTRATION OF PIGS.

Male pigs should be castrated while they are very young, so that they may be fit for slaughter on attainment of the correct weights. The age recommended for the operation is six weeks, or two weeks before they are weaned.

As many beginners do not know how to perform the simple operation of castration, the Department of Agriculture and Stock has made available, free of cost, a very useful and well-illustrated pamphlet—"Castration of Pigs"—which gives detailed instructions in convenient form and in everyday language.

Demonstrations may be arranged, on application, in the course of the instructors' itineraries, either at gatherings where facilities exist for performing the operation, or at a slaughter-yard where young pigs are available. In the latter case it is preferable to demonstrate on a pig carrying more age, say, up to four months—and which can be killed and dressed beforehand. Demonstrating on a dressed porker simplifies procedure, and enables the instructor to explain it without the inconvenience of handling a live pig.

That a better knowledge of the operation of castration is essential is emphasised frequently by bacon curers, meat exporters, and slaughtering inspectors, who often come across carcasses of male pigs which have been castrated improperly. Partial, if not total, condemnation of the hindquarters—the result of abscess formation, the formation of tumours in the scrotum, callous or improperly healed tissue, or some other abnormality—is the inevitable result.

Castration should be done during cool, dry weather and before flies—blowflies, in particular—become numerous. Absolute cleanliness in all details, proper equipment, healthy growing pigs, and a correct knowledge of the job are necessary for success in the performance of the operation.

PIG BREEDING RECORDS.

On every farm where the farmer breeds his own pigs some form of breeding record should be kept, for a record of the productivity of each sow, as well as a herd average, will contain information of much value to the observant breeder. Such records are not difficult to set out, and but a few minutes would be required each week to keep the book up to date. Therefore, a very small expenditure of time and money will ensure a supply of information which may be the means of adding materially to the income from the piggery.

A simple record may be prepared in the following way:—Take an ordinary exercise book or card, and across the top of two facing pages, or the card, rule two lines, between which the breed, name, and date of birth of the sow may be written. Then rule vertical lines to the bottom, and in the spaces between these lines there should be written such information as date of service, date of farrowing, number born, number weaned, pigs sold or killed for meat, gross returns, and remarks. In the remarks column a note should be made of any pigs born dead, the causes of losses up to weaning, and deaths after weaning, as well as remarks concerning the type of growth rate of the litter.

When a complete breeding record is kept for each sow on the farm, the owner can, by studying the individual records, note the sows which have had small litters, or have not reared litters well, and so on. Therefore, if a sow's performance is not good, she should be replaced. By doing this the average for the herd is raised, to the ultimate benefit of the owner.

Another use for records is to compare the results obtained from different foods. By feeding different rations to groups of pigs, and keeping a record of the amount of food eaten and the weight increases made on different rations, the farmer can determine for himself the foods which will give the greatest gain in weight for the least cost or labour.

The useful information to be gained from breeding records does more than merely compensate for the brief time and light expense involved.

CARE OF WEANERS.

To get best results from pigs they should be kept growing steadily from the time they are born until they are marketed. As about half the pig's ration is used to maintain body heat and physical energy, fast-growing pigs will ultimately require less food for maintenance than the slow-growing ones. Hence the practice of growing weaners slowly up to store stage and then feeding heavily for a few weeks is not recommended, particularly when food is plentiful.

Weaners should not be forced to experience sudden changes in diet after their dam has been removed; such changes will check their growth, and weaners so treated usually require extra time and food to prepare them for market.

Heavy weaning weights at eight weeks are evidence of good sows and proper management. At this time the young pigs should be practically independent of the sow if they have been trained to feed from a trough, and so there is little or no check to their growth when weaned. Pigs which weigh 40 lb. to 50 lb. at weaning time usually reach market weights sooner and on less food than weaners weighing 20 lb. to 30 lb. Therefore, proper attention to the weaners is important in any effort to market pigs quickly and economically. One of the rules of the piggery should be *heavy, healthy weaners.*

OILING PIGS.

In cool weather, pigs do not wallow in mud holes as they do in the warmer months and so they do not have their natural protection from body lice.

The pig louse is fairly large—about ⅛ inch in length—and easily seen if the pigs' hair is turned back, or if sucking pigs are examined around the thighs and under the belly.

Pigs which are heavily infested with lice are unthrifty and slow growing, become debilitated, and are more susceptible to diseases.

The control of lice should receive the attention of pig-raisers, for it is uneconomic to have lice-infested stock. Treatment with oil is practicable and inexpensive. Any oil applied to the pig's skin will destroy lice which come in contact with it. An oil in common use is crude petroleum oil. An efficient method of application is by spraying a very thin mist of oil through a pump spray, so that the pigs are completely covered with a thin film of oil. The oiling should be done in the late afternoon so that the sun will not cause the oil to "burn" the pigs. The pigs should be congregated in a race or pen or at the feeding trough, so that time and oil may be saved.

Three thorough oilings given at weekly intervals should assure complete control of pig lice.

PIG-FEEDING.

Grain enters largely into successful pig-raising. The price of maize often makes feeding problems difficult for the pig farmer. On the mixed farm every effort should be made to conserve the carbohydrate-rich crops—Swede turnips, arrowroot, and pumpkins—for the pigs. Molasses can be substituted for half the maize in a ration, but great care must be exercised in getting the pigs accustomed to this quantity. It should be done gradually.

Open grazing should be practised as extensively as possible; and, when porkers show a lean, unthrifty appearance, it will probably pay to carry them on to bacon weight. The farmer with a good stock of feed should be wary of buying more weaners than he can feed. If the separated milk supply is not sufficient, producers are strongly advised to use the meat meal now on the market. It is an excellent substitute.

While curdled separated milk has a slightly higher feeding value than fresh milk in pig feeding, the use of the former is not recommended as a general practice.

The usual method of souring milk on the farm is by holding it for a period in a vat or drum, which usually has an inside lining of decaying milk. This decomposing milk may contain not only the bacteria which cause normal souring of the milk, but also bacteria which are capable of decomposing the milk and turning it into a condition which is harmful to the pig. Further, when souring is practised under uncontrolled conditions, the feeding value of the milk may be greatly reduced by excessive souring.

Considering the very slight advantage of good soured milk over good fresh milk, and the grave risk of an injurious decomposition of the milk when it is soured under the usual farm conditions, it is better to feed the milk fresh from the separator after the froth has been removed.

Milk should not be allowed to remain in the trough after pigs have had their meal. Any milk held over between one separating and the next should be kept in clean drums or cans, which are washed and scalded daily.

The sudden changing from sour milk to sweet milk, or from sweet milk to sour milk, in a pig's diet may readily cause digestive disorder.

Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
E. J. Blake, Rosewood	Sunnyville ..	White Leghorns, Australorps, White Wyandottes, and Rhode Island Reds
W. Brown, Waterworks road, Ashgrove	Strathleven ..	White Leghorns
J. Cameron, Oxley Central ..	Cameron's ..	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlington ..	White Leghorns
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	White Leghorns and Australorps
T. G. Crawford, Stratford, via Cairns	Rho-Isled ..	Rhode Island Reds
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	Australorps, White Leghorns, and Rhode Island Reds
O. M. Dart, Upper Brookfield ..	Woodville ..	Australorps, White Leghorns, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla ..	Dixon Bros. ..	White Leghorns
E. O. F. Eckert, Laidley ..	Laidley ..	Australorps, White Leghorns, and Langshans
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
B. E. W. Frederich, Oxley road, Corinda	Glen Albyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	Australorps and White Leghorns
Gisler Bros., Wynnum ..	Gisler Bros. ..	White Leghorns
G. Grice, Loch Lomond, via Warwick	Kiama ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountain View	Australorps, Minorcas, and Rhode Island Reds
C. and C. E. Gustafson, Tannymorel	Bellevue ..	Australorps, White Leghorns, and Rhode Island Reds
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
S. W. Kay, Cemetery road, Mackay	Kay's	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps and White Leghorns
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Brown Leghorns, and Australorps
W. S. MacDonald, Box 208, Babinda	Redbird ..	Rhode Island Reds and Anconas
F. McNamara, Vogel road, Brassall, Ipswich	Frammara ..	White Leghorns and Australorps
A. Malvine, junr., The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	Australorps and White Leghorns
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White Leghorns, and Langshans
C. Mengel, New Lindum road, Wynnum West	Mengels ..	Australorps
J. A. Miller. Racecourse road, Charters Towers	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, White Leghorns, and Brown Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Light Sussex, and Silver Campines
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Langshans, Rhode Island Reds, Light Sussex, White Wyandottes, Khaki Campbell Ducks, Indian Runner Ducks, and Bronze Turkeys
E. K. Pennefather, Douglas street, Oxley Central ..	Pennefathers ..	White Leghorns and Australorps
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Brown Leghorns, Australorps, Langshans, White Wyandottes, Rhode Island Reds
G. R. Rawson, Mains road, Sunnybank	Rawson's ..	Australorps
J. Richards, Atherton	Mount View ..	White Leghorns and Australorps
W. G. Robertson, Bilson road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa ..	White Leghorns and Australorps
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Crescent ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns and Australorps
P. and K. Walsh, Cleveland ..	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Atherton ..	Weaver's ..	Australorps, White Leghorns, Buff Leghorns, Wyandottes, Anconas, Indian Game, Rhode Island Reds, Barred Rocks, Buff and Black Orpingtons
H. M. Witty, Kuraby ..	..	White Leghorns and Australorps
P. A. Wright, Laidley ..	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

Agricultural Notes

Grow More Fodder.

EVERY year producers in the Maranoa and Western Darling Downs districts are confronted with the difficulty of maintaining the condition of stock during the winter months, when pastures are short and harsh. There is only one way out, and that is to take advantage of the better types of soil available and grow fodder crops —not in a haphazard, casual way, but by using a system by which land is given a fallow period prior to the planting of each crop.

The recent bountiful rains throughout these districts provided an opportunity for making a commencement with a fodder programme and, in view of the erratic seasonal conditions usually encountered, every advantage should be taken of the moisture now in the ground. Many settlers have winter crops, such as wheat, oats, or barley, germinating now, and an excellent practice, particularly after the heavy rains experienced, is to give the crop a light harrowing as soon as the plants have a good hold in the soil. This should be done at right angles to the direction of sowing to check weed growth, prevent evaporation, and give plants a better chance to stool.

Following planting and harrowing, attention should be given to land intended for summer fodders, such as Sudan grass, sorghums, Japanese millet, and cowpeas. There is every temptation to utilise every acre of available cultivation for sowing winter crops. In the very rare years when good winters are experienced, plough and plant methods may work out to some advantage, but far better results, on the average, will be obtained if a systemised cropping programme, including rotation of crops and fallowing, is adopted. Wherever possible, therefore, land which has not been prepared for winter crops should be ploughed and left in the rough state for early spring planting. In this way, moisture at present in the ground will be retained, and even light rains in spring will permit planting at that time. Apart from moisture conservation, the aeration of soil by fallowing oxidises plant foods and makes them more readily available to the growing crop.

THE FALSE ECONOMY OF SMALL TANKS.

It would be interesting to know the amount of money which is actually wasted in Queensland in the course of a year on the excavation of so-called tanks. Anything with a capacity of less than permanency may be regarded as playing with the job rather than doing it.

Of course, the annual rainfall registration has to be regarded as a deciding factor. Generally, the drier the locality and the likelihood of recurring drought conditions, the larger and deeper the tanks should be.

No expense should be incurred on the construction of a tank, unless the supply of water to be stored is sufficient to last for twelve months without replenishment. To bring this to figures, it is estimated that a tank of 4,000 yards is the minimum excavation required to provide water for twelve months. Too often reliance is placed on an excavation which gives out, while there is plenty of feed. The false economy of this should be patent to all.

CROP ROTATION.

Rotation of crops is generally necessary in most systems of farming if the fertility and physical condition of the soil are to be maintained. Apparently, every crop requires some particular combination of plant foods, and by growing the same crop season after season on the same soil, a depletion of the main plant foods required by that crop results. Hence, after continuous cropping for some years, yields may become unprofitable. By growing different crops in rotation, the productivity of the soil may be maintained or even improved in the case of naturally inferior types of soil.

Rotational systems vary with the climatic conditions and the range of profitable crops.

Crops used in rotational systems in various parts of the world are frequently grazed off by stock, or harvested for fodder. Any accumulated manure is thus returned to the land. Where such systems are practised, the organic matter ploughed in as dung assists in maintaining the soil in a satisfactory physical condition. Where stock-raising is less important, a green manure must be included in rotations, which include nitrogen-requiring crops, to obviate any excessive depletion of nitrogen and organic matter. If climatic conditions are suitable, crops such as cowpea, soya bean, clovers, and other legumes can be grown and ploughed under as green manure. Such green manuring usually increases the yields of the following crops.

In dry areas green manuring has not proved so beneficial, as the organic matter decomposes rather slowly. Long fallows have therefore been developed, particularly in wheatgrowing districts. When the crop is harvested, the land is ploughed as early as possible and left in a rough state to trap all subsequent rains. If the crop is stripped, the standing straw should be burned before ploughing, otherwise it may be difficult to obtain a compact seed-bed, and there is some risk of the following crop being deprived of nitrogen.

Crop rotation has received little attention in Queensland, because of the natural fertility of soils which have only been cultivated for a comparatively short period. Climatic conditions have also favoured the cultivation of a particular crop within a well-defined area. As a result, crops such as wheat, cotton, peanuts, and arrowroot are more or less confined to districts which have proved suitable for their successful production.

The need for a more diversified farming system, using a variety of crops in rotation, is clearly necessary in some old cultivations where specialisation in one crop has both decreased fertility and impaired the physical condition of the soil.

Properly devised rotational systems can be expected to yield larger crops, to ensure economy in the use of manures, and generally result in the more profitable working of the available land.

FODDER STORAGE IN CENTRAL QUEENSLAND.

The importance of fodder conservation in Central Queensland cannot be too strongly emphasised, as the transition from an extensive to an intensive use of land has become not only desirable but necessary from an economic point of view. The irregularity of the summer and, more particularly, the winter rainfall makes it imperative to practise fodder conservation.

Adequate supplies of conserved fodder are essential to ensure continuous production of butter and other farm products. The following suggestions may assist in achieving the desired objective:—

Rotational grazing of both native and artificial grasses ensures the most profitable use of the pasture and requires the subdivision of the grazing area into small paddocks. By grazing each paddock in rotation, the grass is fed in its most nutritious form. The young green grass—continuously available when rotational grazing is practised—possesses a high protein content and little fibre, and the nutritive ingredients are very palatable and readily assimilated by stock. Under good seasonal conditions the stock will be unable to cope with the rapidly growing grass. The surplus should be cut when the seed head has just formed, and stored as reserve fodder.

Rhodes grass, so plentiful in the scrub or rain forest areas, as well as ordinary forest grasses, can conveniently be conserved, either as hay or ensilage. While the conservation of fodder as hay is very convenient, it is interesting to note that well-made ensilage is highly nutritive, and can be held for long periods without deterioration.

Hundreds of tons of valuable green feed, which could be converted easily into nutritious fodder, are allowed to waste away annually. During the present season enormous quantities of pasture have been allowed to seed and the nutritive value of the herbage lost. The value of this to the farmer, had it been conserved, would have been considerable.

Lucerne stands supreme as the most useful of all fodders. Unfortunately, the crop needs rather special soil conditions, but when these are favourable, at least a small area should be sown. It is particularly adaptable to grazing and hay making, but the first cut or two from a new lucerne patch are often used in combination with some other form of fodder for ensilage.

The dry seasons which occur sometimes in Central Queensland demand quick-growing crops which recover rapidly after light rains. Sudan grass is better suited to these conditions than the millets. It gives heavy yields over a season's growth; it can stand repeated cutting, and provides feed well into the winter; it produces fine quality green feed, especially after the first cutting, and may be used for either hay or ensilage; and it will grow on comparatively poor soils.

Sorghums generally are especially valuable, as they provide both a bulky and nutritious fodder. Sorghum withstands dry conditions better than maize. It also thrives on poor as well as fertile soils, and provides green, succulent feed well into the winter. When grown for use with Sudan grass and cowpea an excellent combination of crops for ensilage is provided. Sorghum should be harvested for ensilage when the seed is in the dough stage and is best chaffed before the silos are filled.

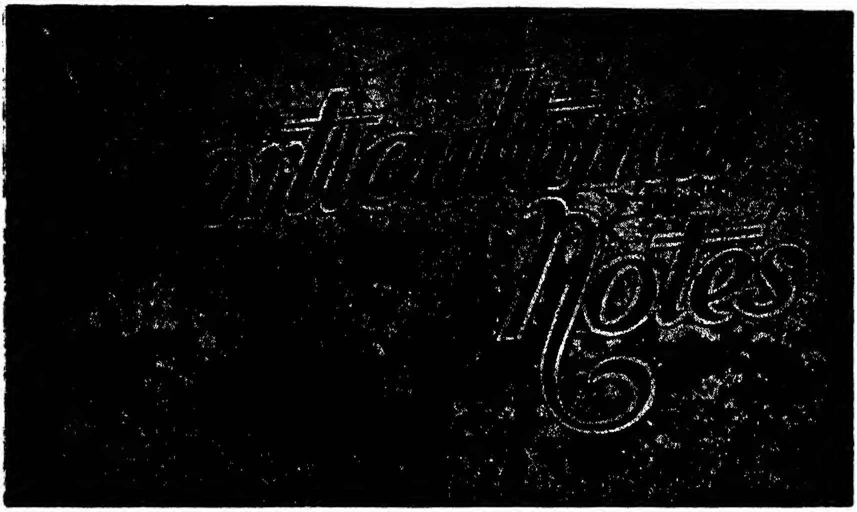
The rainfall during the summer months is usually sufficient to produce summer fodder crops but, unfortunately, winter rains are rather unreliable. In the more favoured areas sufficient rains occur to ensure at least good fodder crops of wheat and oats.

The benefits to be derived from conserving fodders are being gradually appreciated by farmers. Excellent crops are at present being grown in some places in Western Queensland, where the bore water is suitable. Farmers in these favoured localities should utilise the available bore water for the production of fodder crops to some extent at least.

[*Photo.: Lands Department.*

Plate 35.

A ROAD TO A RAIN FOREST SETTLEMENT AREA, NORTH QUEENSLAND.



Packing-shed Equipment.

MANY growers carry on, season after season, with makeshift equipment, when, for a little time and a small expenditure of money, a properly equipped packing shed could be furnished.

Packing stands, nailing-down presses and benches, sizing machines, hammers, stencils, and other equipment should all be gone over and restored to a high state of efficiency. Simple designs for packing stands, nailing-down presses, and case-making benches can be procured, and are not hard to follow by anyone who is useful with a hammer and saw. Simple forms of sizing machines can also be made at home, while those growers who have commercial machines should overhaul them thoroughly, tightening up all screws and bearings, and, if necessary, renewing the padding in the bins and feed channels. Broken parts should be replaced and power plants overhauled. Broken handles in working tools should be renewed. Scrapers and packing needles should be sharpened and greased and packed away until required next season.

Complete sets of new stencils can be cut. A sheet of thin zinc, a small chisel, round, and flat fine-grain files, a hammer, and a piece of end-grain hardwood are the necessary tools. The designs of the letters to be cut can easily be made by obtaining stencils and copying them on to the zinc in the design wanted. The stencilled letters are then cut out of the sheet of zinc with hammer and chisel, and in that way an excellent stencil is made. Stencils are easily obtained, and there is no need to use blue crayon for marking cases.

When the overhauling of plant has been completed, growers should turn their attention to the cleanliness of the packing shed. Old cases and picking-boxes should be repaired or burned, a close inspection of the cracks and crevices being made for pupating insects, such as codling moths. Any shed-stored fruit which has rotted in the cases should be removed and destroyed and the cases thoroughly sterilized by completely immersing them in a 5 per cent. solution of formalin for at least one minute. Floors and other parts of the building affected by juice from rotted fruit should also be treated.

Close attention to these details will enable growers to make a clear start at the next harvesting period.

AN ALTERNATIVE FRUIT FLY LURE.

Recent fruit-fly trapping experiments in coastal citrus orchards indicate that an ammonia-pollard lure gives better results than the well-known ammonia-vanilla lure. The formula is:—Cloudy ammonia 1 teaspoonful, pollard 2 level teaspoonfuls, rain water 1 pint.

Traps containing this lure required changing every six days under normal conditions in the experimental orchards. In hot weather, when the rate of evaporation is high, or if large numbers of flies are caught, it may be necessary to renew the lure at shorter intervals. At each change of lure the traps must be washed thoroughly before they are refilled. The lure should be well stirred while the traps are being filled, as the pollard settles out rather rapidly if this precaution is omitted.

The ammonia-pollard lure has the apparent disadvantage of catching considerable numbers of other insects, such as blowflies, which tend to foul the traps. As the Queensland fruit fly is attracted as soon as the traps are put out in the trees, this is of no great importance.

This alternative lure is cheap and easily prepared, and growers of deciduous fruit may care to use it as an alternative to the ammonia-vanilla lure during the next few months.

PLANTING THE QUEENSLAND NUT.

Where it is proposed to plant an area of the Queensland Nut on open or forest ground, the land should now be got ready for planting time in August. Thorough deep ploughing of the area will be necessary to give the young trees a sufficient depth of a free soil in which to make a good root system. Subsoiling, if practicable, is also desirable.

When planting the young trees a good hole, at least 2 feet across and 18 inches in depth, should be dug so that the tap root—which is comparatively long—can be properly set vertically into the ground, and the secondary roots distributed evenly around the plant.

In digging the trees from a seed bed care must be taken to remove them as carefully as possible and to get a good length of the tap root with the plant. If the tap root is injured during digging, care should be taken to cleanly prune off the injured portion above the point of mutilation. If the tap root is too long, it can be pruned back about 8 inches.

It is advisable to soak the bed thoroughly the day before lifting the young trees, as this will make it easier to extract them from the ground without breaking the roots. Loosening the soil by making a trench, 15 to 18 inches deep, alongside the rows, will simplify digging.

The trees should be planted in the ground at the same level as they were in the nursery bed, or perhaps a little deeper. Excessively deep planting should, however, be avoided.

The young trees should be well watered at the time of planting, and also subsequently, should the weather be dry.

On open land, shade should be provided by driving sufficient stakes into the ground around them to support a light hessian or bag cover.

Very often the main stem of the tree is allowed to grow too high before the top is pruned off. This will result in an ungainly, lanky tree. With the Queensland Nut, as with fruit trees, pruning should aim at producing a sturdy-set tree, well-balanced and fairly open.

The young trees should not be allowed to grow beyond 2 feet in height on a single stem before the top is pruned back. Three side shoots nicely placed are later trained to make the framework of the tree.

Many young trees do not come away well on a single stem, this failure being due to a variety of causes, and a cluster of base shoots may arise as a consequence. It will then become necessary to select the strongest and best-situated shoot to form the tree, the others being cleanly cut away.

No matter whether the trees be planted amongst bananas, pineapples, or other fruits, or in the open, a good stake should be driven alongside each tree, both to protect and support it. Many young trees are destroyed or permanently misshapen by injuries caused during cultural operations, and some protection is clearly necessary.

Where young trees have grown very densely through too many low shoots having been permitted to grow, a certain amount of thinning out of surplus main branches, or of the secondary growths, will be necessary to open up the trees to light and air.

SELECTION OF NEW BANANA LAND.

Intending banana-growers would be well advised to give timely and serious consideration to the selection of new banana land before clearing ground for the 1941 planting.

Of late years bananas have been grown extensively and fairly successfully on inferior forest country, but the general experience is that a suitable aspect and good cultural methods have been the chief factors in successful banana planting.

The best aspect, of course, is the north-east or northerly slope, with standing timber on all four sides to give the necessary shelter from strong winds, and these aspects ensure the maximum amount of winter sunshine.

With sites facing any further into the east than north-east, great care should be taken that, as far as possible, the area is sheltered from the cold south-east winds. An efficient breakwind on the south side of an easterly patch should, therefore, be provided for in the clearing plan. The site chosen should be so situated that tall timber or hills at the top of the proposed area will not shut out the winter sun at an early hour.

A north-westerly slope is preferable to south-east, south, or south-westerly slopes if heavy belts of timber block the strong westerly winds. Many good bananas have been grown on westerly slopes of this description chiefly because the areas in question receive the sun during the whole of the afternoon.

All southerly slopes should be definitely avoided, more particularly if there is open country for any distance around the proposed area. Much more timber will have to be felled than actually required for planting to obviate the long shadows which standing timber at all close to the patch throw over the plantation. The limited period during which they are exposed to the sun is the chief objection to all southerly slopes.

A good warm-slope plantation will produce from two to three bunches to every one on the cold-slope areas. Production costs, particularly to the grower on leased ground, enter so largely into the picture that intending growers with a choice of ground should always choose a warm situation to gain the best results.

PAPAW SEED.

Now that the papaw planting season is at hand many requests are being received at the Department of Agriculture for sources of guaranteed seed, particularly of bisexual types.

For general information, it may be stated that until Departmental investigations which have now been in progress for several years are completed, the Department is not in a position to recommend any particular seed with certainty. Seeds have been sold by some seed sellers in the past as pedigreed seeds, but when they have been germinated and the plants have flowered they have been shown to be ordinary males and females. Fruit types also cannot be guaranteed unless particular pollination of the parent flowers is ensured by bagging at the correct time to prevent pollination from undesirable sources.

Growers are advised therefore for the time being to obtain seed from sources from which they know the seed has been selected by the growers for their own plantings over a period of years. Even with such seed they should not expect anything like 100 per cent. of fruit true to parent types.

THE FRUIT MARKET.

J. H. GREGORY, Instructor in Fruit Packing.

WHAT will 1941 bring forth? No overseas export of apples to Europe and almost a record crop of quality apples to dispose of; acquisition by the Commonwealth with its supporters and its opponents. The critics of acquisition would do well to reflect that, whatever its shortcomings, growers of quality fruit are guaranteed a price equal to 8s. 6d. per case, which is on a par with prices obtained for export fruit in normal years. Growers must also ask themselves, "What is there for us without this controlled marketing?" Anomalies will inevitably occur, but it is better that growers give their active support in endeavouring to overcome these difficulties rather than increase their troubles by means of passive resistance.

As the heavy supplies of apples in Australia must affect the sales of other fruits to some extent, it will be necessary for growers to make quality their aim when marketing citrus and tropical fruits. The problem this year will be to prevent, not only an oversupply of good fruit to the markets, but also an overmarketing of poor quality fruit. With this achieved, payable returns should be obtained for all fruits.

Prices during the last week of January were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 5s. to 7s.; Sixes, 5s. to 8s.; Sevens, 6s. to 10s.; Eights and Nines, 9s. to 11s.

Sydney.—Cavendish: Inferior to 7s.; Sixes, 10s. to 13s.; Sevens, 12s. to 14s.; Eights and Nines, 13s. to 15s.

Melbourne.—Cavendish: Sixes, 10s. to 11s.; Sevens, 10s. to 12s.; Eights and Nines, 7s. to 13s.

Brisbane.—Lady Fingers: 2d. to 10d. per dozen. Sugars: 1d. to 6d. dozen.

Pineapples.

Brisbane.—Smoothleaf: 2s. to 6s. per dozen; 4s. to 7s. per case. Ripley: 3d. to 2s. 6d. per dozen; 2s. 6d. to 6s. 6d. per case.

Sydney.—Smoothleaf: 6s. to 10s. per case. Many poor lines on market.

Melbourne—Smoothleaf: 8s to 12s. per case. Market slow, and tendency for prices to ease.

Papaws.

Brisbane.—Locals: 2s. 6d. to 4s. bushel. Gunalda: 2s. 6d. to 4s. bushel.

Sydney.—8s. to 14s. tropical case.

Melbourne.—10s. to 14s. tropical case.

Monstera Deliciosa.

Brisbane.—3s. to 4s. 6d. dozen.

Mangoes.

Brisbane.—Locals: 5s. bushel. Specials: 7s. to 10s.

Sydney.—Commons unsaleable. Specials to 9s. bushel.

Melbourne.—Commons unsaleable. Specials: 8s. to 12s.

Passion Fruit.

Brisbane.—First grade, 8s. to 10s. half bushel; Seconds, 6s. to 7s. half bushel.

Sydney.—5s. to 9s.

Melbourne.—6s. to 8s.

CITRUS FRUITS.

Oranges.

Brisbane.—New South Wales Valencias: 12s. to 14s.

Lemons.

Brisbane.—Gayndah: 16s. to 24s. bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 9s. to 14s. Granny Smith, only large sizes permitted, 13s. to 15s. Delicious, 11s. to 14s. Gravensteins, 10s. to 15s. Cookers, 8s. to 12s.

Pears.

Brisbane.—W.B.C., 4s. to 8s. Market easing.

Peaches.

Brisbane.—Stanthorpe, 3s. to 7s.

Nectarines.

Brisbane.—3s. to 6s. half-bushel.

Plums.

Brisbane.—4s. to 6s. Some Specials to 8s.

Quinces.

Brisbane.—Stanthorpe, 7s. to 8s.

OTHER FRUITS.

Grapes.

Brisbane.—Local Muscats, 5d. lb. Stanthorpe, 9s. to 10s. Stanthorpe White Grapes, 2s. 6d. to 5s. Black Prince, Coleman, 7s. to 8s.

MISCELLANEOUS VEGETABLES, ETC.

Watermelons.—2s. to 12s. dozen.

Rockmelons.—3s. to 5s. dozen.

Cucumbers.—3d. to 9d. dozen.

Pumpkins.—Brisbane, 3s. to 5s. bag. Sydney, 6s. cwt. Melbourne, 6s. bag.

Marrows.—Brisbane, 1s. to 2s. 6d. dozen.

Lettuce.—1s. to 1s. 6d. dozen.

Cabbages.—Brisbane: Stanthorpe, 4s. to 8s. bag. Locals, 1s. 6d. to 6s. dozen.

Beans.—Brisbane: Stanthorpe, 3s. to 5s. Specials higher.

Peas.—Brisbane: Stanthorpe, 4s. to 7s. bag. New South Wales, 8s. to 16s. per two-bushel bag.

Beetroot.—3d. to 9d. bundle.

Chokos.—4d. to 1s. dozen.

Carrots.—Brisbane, 3d. to 6d. bundle. Sydney, 12s. to 18s. cwt.

Tomatoes.

Brisbane.—Ripe, 2s. to 4s.; Coloured, 2s. to 5s.; Green, 2s. to 3s. 6d.

Sydney.—3s. to 6s. half bushel.

THE COUNTRYMAN'S SESSION

Sunday Morning Radio Service to Farmers

Every Sunday morning at a quarter to nine o'clock, a bright, topical, and entertaining programme of information on rural subjects is broadcast from National and Regional Radio Stations. (By arrangement with the Australian Broadcasting Commission.)

Farmers are recommended to tune in to—
4QS, 4RK (Rockhampton), or 4QN (Townsville).

EVERY SUNDAY AT 8.45 a.m.

Weather and market reports and a wide variety of farm topics.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society and the Ayrshire Cattle Society, production charts for which were compiled during the month of December, 1940 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORNS.			
	MATURE COW (STANDARD, 350 LB.).			
Kyabram Marie 2nd	A. H. E. Black, Kumbia	12,249·5	546·73	Ledger of Greyleigh
Rosenthal Choice 15th	S. J. H. Mitchell, Rosenthal, Warwick	9,653·23	386·925	Rosenthal Musket
Burradale Shamrock 11th	A. H. E. Black, Kumbia	8,022·19	360·918	Burradale Eclipse
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Sunnyview Evelyn 7th	T. Ryan, Allora	9,248·5	359·917	Burradale Byron
Blacklands Thelma	T. Ryan, Allora	7,952·2	326·22	Blacklands Major
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Penrhos Mayflower 3rd	Alex. Sandilands, junr., Penrhos, Wildash	6,449·5	275·683	Rosenthal Pendant's Price
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Kyabram Marie 5th	A. H. E. Black, Kumbia	7,259·47	317·809	Ledger of Greyleigh
Kyabram Marie 4th	A. H. E. Black, Kumbia	6,467·3	302·457	Ledger of Greyleigh
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Merravale Ruby 12th (Twin to Ruby 11th)	W. Soley, Malanda	10,568·0	342·964	Greyleigh Honorarium
Bingleigh Molly (251 days)	J. C. Meiers, Mount Mort	8,437·8	324·731	Blacklands Patrol
Chelmer Ivy	E. O. Jeynes, Raceview	7,966·0	318·402	Daphne's Elect
Penrhos Pansy 4th	A. Sandilands, junr., Penrhos, Wildash	7,320·13	303·824	Rosenthal Surprise
Glengarry Lady Primrose	G. Waugh, Glengarry, Peeramon	7,421·1	287·93	Glengarry Sultan
Penrhos Handsome 7th	A. Sandilands, junr., Penrhos, Wildash	6,247·74	243·697	Rosenthal Surprise
Penrhos Pansy 5th	A. Sandilands, junr., Penrhos, Wildash	5,463·25	232·004	Rosenthal Surprise
Merravale Ruby 11th (Twin to Ruby 12th)	W. Soley, Malanda	7,820·4	231·689	Greyleigh Honorarium
Navillus Olive 5th	C. O'Sullivan, Navillus, Greenmount	6,120·95	230·175	Alfa Vale Prince Henry
	JERSEY.			
	MATURE COW (STANDARD, 350 LB.).			
Daffodil of Linwood	F. W. Kath, Moffatt, *via* Dalby	10,013·57	585·76	Aerofoil of Banyule
	JUNIOR, 4 YEARS (STANDARD, 310 LB.).			
Westbrook Safety 14th	Farm Home for Boys, Westbrook	8,805·65	437·236	Oxford Gem's Ambassador
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Oxford Faith	E. Burton and Sons, Wanora	6,422·25	366·945	Oxford Peer

	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Westbrook Safety 19th	Farm Home for Boys, Westbrook	7,347·6	364·18	Westbrook Prince 3rd
Peeramon Shirley	A. H. O. Koppen, Peeramon	5,502·55	342·635	Trinity Popcorn 2nd's Pioneer
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Trinity Cute Daffodil	J. Sinnamon and Sons, Moggill	6,833·24	356·371	Samaris Cute Prince 3rd
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Strathdean Fern's Crystal	S. H. Caldwell, Walker's Creek, Bell	6,307·04	353·421	Langside Noble Dreamer
Tecoma Sally	W. J. Semgreen, Tecoma, Coolabunia	3,994·45	275·652	Kathleigh Standard
	AYRSHIRE.			
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Myola Joyce 2nd	R. M. Anderson, Southbrook	8,896·08	340·427	Benbecula Bonnie Willie

General Notes

Staff Changes and Appointments.

Messrs. L. G. Newton and G. R. Moule, University scholarship holders, who recently obtained their degree in veterinary science, have been appointed assistants to veterinary surgeons, Mr. Newton to be attached to the Animal Health Station, Yeerongpilly, and Mr. Moule to the head office of the Department of Agriculture and Stock.

Mr. A. J. Unwin (Treasury Department) has been appointed Deputy for Mr. E. A. Crosser as a member of the Rural Development Board during the latter's absence on leave.

Mr. G. B. Gallwey, Inspector of Accounts under *The Dairy Produce Acts*, Department of Agriculture and Stock, has been appointed also an inspector under *The Margarine Acts.*

Mr. C. N. Hall, of Epping, Sydney, has been appointed an inspector under *The Diseases in Plants Acts.* This appointment automatically vests Mr. Hall with authority to act as in inspector under *The Queensland Fruit and Vegetables Acts,* and has been made to permit of an inspector appointed under the New South Wales *Dried Fruits Act* to make inspections in Queensland under the newly gazetted *Dried Fruit Grading and Packing Regulations.*

Messrs. C. N. Barnham (Struck Oil, via Moongan), T. Scotney, J. E. W. Wright, J. C. Batt (councillors of the Gooburrum Shire Council, Bundaberg), and W. N. C. Dahl (Bucca) have been appointed honorary protectors of fauna.

The appointment of Mr. R. Kerwin (puntman, Norman River Crossing, Normanton) as an acting inspector of stock has been terminated.

The officer in charge of Police, Goondiwindi, has been appointed also an acting inspector of stock.

Millaquin Mill.

Regulations have been issued under *The Primary Producers' Organisation and Marketing Acts* empowering the Millaquin Mill Suppliers' Committee to make a further general levy for administrative purposes on suppliers of sugar-cane to Millaquin, at the rate of one half-penny per ton, during the current season.

Commodity Boards.

Orders in Council (2) have been issued under *The Primary Producers' Organisation and Marketing Acts* extending the operations of the Northern Pig Board for the period from 1st January, 1941, to 31st December, 1946, and the Cotton Board from 1st January, 1942, to 31st December, 1946.

Messrs. J. E. Foxwell (Kureen), D. Johnston (Malanda), C. W. Roseblade (Yungaburra), W. Scott (Peeramon), W. J. Sloan (Malanda), and H. S. Hunter (Director of Marketing) have been appointed members of the Northern Pig Board until 31st December, 1943.

The following have been appointed members of the Cotton Board until 31st December, 1943:—Messrs. F. R. Saunders (Wowan), E. Schuenemann (Goovigen), J. Warner (Thangool), E. J. Basson (Three Moon, Monto), H. F. Lindenmayer (Mundubbera), J. A. Peach (Ropeley East, Gatton), and H. S. Hunter (Director of Marketing.

Cane Prices Board Appointments.

Babinda Local Board.—Millowners' representatives: W. J. Ryan and N. Swendson; canegrowers' representatives: W. M. Simmonds and J. T. Trembath; chairman: F. W. Blake.

Goondi Local Board.—Millowners' representatives: A. H. Edwards and L. M. Smith; canegrowers' representatives, H. Klarwein and R. J. Wright; chairman, C. Burchill.

Hambledon Local Board.—Millowners' representatives: K. L. Cragg and J. G. L. Gillett; canegrowers' representatives: W. W. Chapman and W. D. Ishmael; chairman: E. L. Moore.

Invicta Local Board.—Millowners' representatives: H. B. Burstall and J. L. Mullins; canegrowers' representatives: H. F. Hecht and W. E. G. Smith; chairman: A. M. Taylor.

Isis Local Board.—Millowners' representatives: J. Alison and J. W. Clayton; canegrowers' representatives: W. M. Duncan and E. P. Noakes; chairman: E. H. Baker.

Kalamia Local Board.—Millowners' representatives: J. W. Gray and J. W. Inverarity; canegrowers' representatives: W. H. Ferguson and P. Sayers; chairman: A. M. Taylor.

Macnade Local Board.—Millowners' representatives: K. L. Coates and F. J. Waring; canegrowers' representatives: K. Livingston and W. A. Lyon; chairman: John H. Moore.

Marian Local Board.—Millowners' representatives: A. J. Coyne and R. J. Leck; canegrowers' representatives: G. Ollett and E. C. Walz; chairman: C. B. Buxton.

Mount Bauple Local Board.—Millowners' representatives: S. A. Cunningham and A. G. Morris; canegrowers' representatives: A. R. Greensill and R. A. Maike; chairman: J. A. Murray.

Mourilyan Local Board.—Millowners' representatives: G. R. Blair and H. G. Selby; canegrowers' representatives: G. F. Hudson and J. F. McCutcheon; chairman: C. Burchill.

Mulgrave Local Board.—Millowners' representatives: M. A. Doolan and H. N. Whitaker; canegrowers' representatives: E. M. Bennett and W. C. Griffin; chairman: P. M. O'Connor.

Pioneer Local Board.—Millowners' representatives: G. R. Ashwell and J. W. Black; canegrowers' representatives: B. S. Donovan and L. W. J. Hoey; chairman: A. M. Taylor.

Racecourse Local Board.—Millowners' representatives: N. Bennett and A. S. Hamilton; canegrowers' representatives: A. Franettovich and M. J. Sexton; chairman: H. L. Kingston.

South Johnstone Local Board.—Millowners' representatives: F. H. Gilmore and J. McFadden; canegrowers' representatives: W. J. Henderson and A. H. Reichardt; chairman: C. Burchill.

Victoria Local Board.—Millowners' representatives: A. B. Farquhar and F. J. Waring; canegrowers' representatives: E. L. Burke and G. G. Venables; chairman: John H. Moore.

Barley Advance Payment.

The Minister for Agriculture (Mr. F. W. Bulcock) has announced that the chairman of the Queensland Barley Advisory Committee (Mr. H. S. Hunter) had drawn his attention to the fact that the first advance on barley of the 1940-41 crop had been fixed by the Australian Barley Board at the following rates, viz.:—Chevalier, malting No. 1 quality, 2s. 9d. per bushel; No. 2 quality, 2s. 6d.; No. 3 quality, 2s. 1d.; feed quality, 2s.; Cape, malting No. 1 quality, 2s. 6d. per bushel; No. 2 quality, 2s.; No. 3 quality, 1s. 10d.; and feed quality, 1s. 9d.. All of these payments are subject to deduction for freight from country siding to Toowoomba.

These rates of first advance are considerably higher than the first advance paid by the Australian Barley Board last year.

The Board is anxious to get delivery of all new season's grain as early as possible, so that marketing arrangements may be proceeded with, and therefore it is in the interests of growers to make prompt delivery of such barley as is not required for their own feed and seed requirements.

The crops of all States have been considerably affected by drought, and as a consequence the new season's crop, plus a carryover of 1½ million bushels in South Australia, is expected to be approximately sufficient for Australian needs without leaving any surplus for export.

Last year the Board handled 11,600,000 bushels of barley in Australia, all of which has been sold to buyers, including the following sales to overseas countries, viz.:—Japan, 2,566,666 bushels; New Zealand, 828,455 bushels; Switzerland, 103,281 bushels; United Kingdom, 244,532 bushels; Belgium, 6,804 bushels; a total export of 3,749,738 bushels.

8

Answers to Correspondents

VETERINARY ADVICE.

(Selections from the outgoing mail from the office of the Director of Veterinary Services.)

Greasy Heel.

G.H.M. (Many Peaks)—

From your description your draught foal is suffering, as you suggest, from a a greasy heel. This condition is a difficult one to clear up, though the following treatment is effective, provided it is carried out with perseverance.

1. Clip away the hair from the affected part below the fetlock, taking care not to clip the tuft of hair from the ergot at the back of the fetlock.

2. Cleanse the area below the fetlock with a good disinfectant, such as safonia water. A little petrol, which is very effective for removing the matted discharge, may be used.

3. Keep the part clean. This is best done by placing a single strip of hessian loosely around the leg below the fetlock. With the movement of the foot, this hessian works around and keeps the surface of the affected part wiped free of discharge dirt.

4. Apply a dressing made up of—Turpentine, 2 parts; creosote, 1 part; olive or linseed oil, 2 parts. This dressing should be applied daily and a clean piece of hessian put on the pastern after dressing. The animal should be allowed to run on dry paddocks only.

5. The swelling of the lips appears to be due to the foal biting at the greasy heel, thus infecting the lips and gums. The swelling of the throat may be due to swollen glands.

It would be advisable to treat inside of the lips, cheeks, and gums with Gentian Violet 1 per cent. It should be applied once daily so that the tissues become a deep blue. When the inflammation subsides, discontinue the treatment. An endeavour should be made to prevent the foal reaching the dressing.

Gentian Violet solution may be obtained from a chemist.

Worms in Cattle.

M.L.D. (Landsborough)—

Adult cattle rarely suffer any ill-effects from worm infestation, the trouble usually being confined to younger animals.

The worm most commonly causing symptoms in calves in the stomach worm. This may be treated by drenching with copper sulphate, 1 lb. in 2½ gallons of water. The rate is as follows:—

Animals 2-4 months old—1½ to 2 fluid oz.
Animals 4-8 months old—2 to 3 fluid oz.
Animals 8-12 months old—3 to 4 fluid oz.
Animals 12-18 months old—4 to 5 fluid oz.

This is given without preliminary starvation and should be repeated in fourteen days.

Tuberculosis in Pigs.

J.K. (Fassifern)—

Tuberculosis in pigs can usually be traced to infection in the dairy herd and the best way of dealing with the disease is to be submit the herd to the tuberculin test and eliminate all reactors. This action usually eliminates tuberculosis from the pigs. Pigs themselves are not usually tested. If you consider testing of your daily herd, it is suggested that you communicate with the Department of Agriculture and Stock stating the number of your cattle in the herd, including bulls, and calves over the age of three months.

The Feeding of Sorghums and Sudan Grass.

S.C. (Pilerwa)—

A crop of Sudan grass should be allowed to seed before stock are allowed to graze it, and it is certainly advisable to follow this practice for second as well as for first crops.

As to the feeding of grain sorghum to pigs, it is advisable to allow immature plants to wilt for twelve to twenty-four hours after cutting before feeding to the pigs. When feeding mature grain sorghum, there is practically no danger and the grain may be fed as gathered.

The active principle in the sorghums and sudan grass which poisons cattle is very potent, and often cattle show very few early symptoms except "bloat," and consequent laboured breathing, general discomfort, and finally death.

When cattle develop symptoms after feeding on sudan grass or sorghum, the following treatment will be effective:—

Give the affected animals a drench, consisting of 2 ounces of hyposulphite of soda (ordinary hypo) which may be obtained from any chemist, in about 1 pint of water. Repeat the dose every half hour if necessary.

Should the animals show extreme symptoms the left side should be punctured with an ordinary trocar and canula, and after the trocar has been removed the dose of hypo recommended may be poured down the canula, so that it enters directly into the paunch. The canula may be left in position and the dose repeated every twenty minutes.

Joint Ill. Scours in Calves.

F.A.B. (Roma)—

(1) Joint ill in baby calves is a condition caused by a germ which may gain entrance to the animal's body through the navel before it has dried up, or through the mouth. Irrespective of how the germ gets into the body, when once established the possibility of the calf growing into a useful cow is not really favourable and you were certainly wise to shoot and burn the affected animals.

(2) As you have a large number of calves you would be well advised to adopt immediate preventive measures. Carefully examine all calves for any symptoms of the disease and in your examination include the navel of each beast. Healthy animals, with a normal dried navel and showing no symptoms of scours, should be moved to fresh yards, and should be maintained in these yards and not returned to the old pens. New calves coming along should also be taken straight to the new yards, after their navels have been treated with some disinfectant such as tincture of iodine.

Any calves among those you have at present that have moist navels, unless they are very young, should be viewed with suspicion and should not be taken to the new yards until the navel dries up and there is no sign of joint ill. Calves which are scouring should not be taken to the new yards until they have recovered from this condition (treatment below). They should also be examined for joint ill before they are moved.

If it is your custom to bring the "springers" up to a yard near the dairy to calve, it is suggested that you change the yard, as the calves could pick up infection from this source.

(3) Calves which are scouring should be given 2 to 4 oz. of castor oil, depending on age and size of calf, and after twenty-four hours they should be put back on a diet of equal parts of whole milk and water. One cupful limewater should be added to each feed.

Mammitis.

J.F.G. (Brackenridge)—

It is suggested that the following treatment be adopted for mammitis in a dairy cow:—Keep the affected quarter empty by frequent strippings four to five times daily. The affected quarter should be frequently massaged with camphorated oil at each stripping. Very great care should be taken to prevent the spread of infection from the affected to clean quarters. It is suggested that a sample of milk from the affected quarter be forwarded with a covering letter to the Director, Animal Health Station, Yeerongpilly, for bacteriological examination. If the condition is found to be due to infection with mastitis organisms, a vaccine can be prepared for treatment of the animal. Information on the use of vaccine is supplied by the Director, Animal Health Station, Yeerongpilly.

Rural Topics

The Will to Win.

"What arms are more steadfast than loyal hearts!" as Chrysostom said. Here is a news item from England—

The Minister of Agriculture (United Kingdom) has acknowledged the return of a payable order issued by his Department in respect of the £2 per acre grant for the ploughing of old grass land to a well-known farmer. The farmer asked that the amount of his subsidy be placed to the credit of the national war effort, which shows that the "will to win" can be expressed just as willingly by paying out as by ploughing in.

Makers Learn from Users.

"Let the other fellow experiment" is a slogan that looks all right at first glance, but the implication is that the farmer should never get off the well defined road, or, say, out of the old well-worn rut. "Nothing venture, nothing win," and often it is a good thing to straddle the rut, or find a new way round. Take agricultural machinery, for instance. How often has the maker been indebted to the user; in fact, many of our modern farm implements and machinery units had their origin in the fertile brains of farmers who gave a lot of thought to the finding of easier and quicker ways of doing a job. Machinery makers acknowledge the value of many a suggestion that farmers have made for the more effective working of their field units. A famous agricultural machinery manufacturer, addressing a gathering of farmers, many years ago, said that "the makers must learn from the users." So, if we are satisfied always to let the other fellow experiment and do not use our own brains and opportunities, or keep the results of our own experience to ourselves, we may be guilty of mental laziness or, perhaps, carelessness, thoughtlessness, and even selfishness. The fact remains, however, that users do give manufacturers something more than useful hints, and that this form of co-operation is extremely valuable to rural industry generally.

New Veterinarians.

The day when veterinarians can cure every disease there is, and farmers never grumble about the cost, probably never will arrive. But it is certain that veterinary science is advancing rapidly and that farmers are appreciating more and more that close co-operation with their veterinarians can pay them rich dividends in healthier, more productive animals.

So the new graduates from the School of Veterinary Science within the University of Queensland are assured of the hearty goodwill of Queensland stockowners.

The Blow Fly's New Job.

Blowflies have uses undreamt of by sheepmen, to whom they are a perennial curse. In a seed-raising establishment at Ryde near Sydney they have been used as pollinators with outstanding success.

The object there is to experiment with various vegetable crops under glass with a view to raising pure seed, much more of which may be needed if oversea supplies are further restricted. The programme of work includes experiments dealing with the culture of the crops and the overcoming of problems in seed-raising technique.

In the Ryde experiments crops have been grown in tins in the open and transplanted to the glasshouses to run to seed, whilst other crops have been grown entirely within the glass houses.

To obtain effective pollination bees were introduced to the glasshouses, and, whilst they did a certain amount of good work, they were not wholly satisfactory because of their constant desire to travel further afield in search of nectar. This urge sooner or later led them to the glass where, in their endeavour to get out, they became exhausted and died.

So blowflies were bred and liberated, not only inside the glass houses, but also inside cheesecloth tents, which isolated certain uncommon vegetable varieties. The blowflies proved remarkably successful. They were rapidly attracted to the flowers by the smell, and so distributed the pollen most effectively. Good for the seedsman, but there is not much consolation in that for the woolgrower.

Fly Flapping and Trapping.

A gadget for alleviating fly-worry of farm and station stock is in effective use in many parts of the United States. We all know how animals suffer from the fly pest during summer, and especially after general rain.

This new device for brushing off flies is built like a cage, 7 feet wide, 6 feet high, and 10 feet long. It is open at both ends and the sides and top are fly-proof. Canvas flaps hanging from the ceiling and adjusted on frames attached to the floor brush the flies off every part of an animal walking through. The flies so disturbed are caught in large numbers in simple traps arranged on the walls of the structure.

The device is usually placed at a strategic point through which stock are most likely to pass—such as the entrance to a yard or shelter shed, or when going to water. Where and when flies are very troublesome, cattle and horses particularly are said to learn very quickly how to make use of this fly flap-trap.

The Value of Cotton Seed.

Although most of the present-day knowledge of the feeding value of cotton seed meal, cake and hulls is the result of more recent research and experience, historical records show that the Chinese fed cotton seed cake to cattle hundreds of years ago, while more than 150 years ago the London Society of Arts offered a gold medal for oil and cake made from cotton seed, having noted the value of the cake as a cattle feed. Cotton seed feed products are to-day standard stock feeds, and so Queensland cotton-growers are assured of a profit both for stock feed and fibre.

The "Master of the Swine Herd."

The champion Middle White boar, "Queen State Corona 2nd" 6140, a son of the imported "Watford Corona" 5949 and from "Watford Gracious Lady 37th" (imp.) 5948, owned by the Queen State Stud, the property of the Queensland Department of Agriculture and Stock, has been awarded the special silver medal presented by the National Pig Breeders' Association of England for the best Middle White animal penned. The medal is suitably endorsed and carries an illustration of an original woodcut representing the "Master of the Swine Herd."

Progeny of this boar have been awarded second prize over seventeen months, first prize over eleven and under seventeen months in boars; first and third prizes for sow over eleven and under seventeen months, and also have produced some of the winners in boar and progeny, sow and progeny, and the breeders' group.

Approximately 90 per cent. of the Middle White pigs penned at the 1940 Royal National Exhibition carried blood of the Watford Corona (imp.) strain, all being lengthy, well-developed pigs, typical of the latest improved British type.

The skeleton of the imported boar is being preserved for demonstration purposes at the Veterinary Science School, University of Queensland.

Tenderness in Wool—Effects of Feeding.

By breeding and improved nutrition, it is hoped to reduce the tenderness and break in fleeces which are characteristic of sheep running on some of the drier country in different parts of the Commonwealth.

Research men who have been studying the problem have found out that under poor conditions of growth the fibres of a staple may be only a third as great in one part of a wool staple as in another without a break in the fleece being noticeable. Their work has created much interest among graziers, and many stud sheep breeders have sent to them wool samples for analysis.

It is clear that better feed would, in many instances, overcome the tenderness and breaks in the wool of sheep grazed on the drier country of the continent. This leads to the question of determining the most economical means of improving nutrition under widely varying conditions. Selection and breeding also come into the realm of research on this problem.

The Effect of Fertilizers on Food Products.

A new branch of agricultural research has been undertaken by the United States Department of Agriculture. This deals with the improvement of the nutritional value of food through better fertilization. A laboratory has been established, and at this centre of effort it is expected that facts will be developed that will enable practice in soil management and crop production to be dovetailed more closely with human nutritional needs.

Farm Notes

MARCH.

PREPARATION of land on which it is intended to plant winter cereals should be well advanced. Sowings of lucerne may be made about the end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has many advantages, not the least of which is that weeds will not make such vigorous growth during the succeeding few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Seed wheat should be treated with copper carbonate for the control of bunt. For oats and barley seed, the use of formalin or a reliable mercury dust is advisable.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where the potato crop is subject to Irish blight, it is advisable to spray the plants for the control of this disease. Bordeaux mixture of 4.4.40 strength should be applied at least three times at intervals of ten days to a fortnight, commencing when the plants are about six weeks old.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Selected grain which is intended for future seed supplies should be well fumigated for thirty-six hours and subsequently aerated and stored in airtight containers. The germination of the maize is not normally affected by this treatment if dry and mature when treated.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Because of the smallness of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be given to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials in dairying, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods planned for the successive sowings of seed.

Early-planted cotton crops should be now ready for picking, but this should not be done while there is any moisture on the bolls, either from showers or dew. Picked cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bags, or hessian sheets before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *Phalaris tuberosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops showing no promise of satisfactory yields of grain would be well advised to convert them into silage for winter feed. Green maize, especially when fed with lucerne or cowpea, is a valuable fodder. Where crops of Sudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage of converting into silage, it will be found that this method of conserving them has much to recommend it. If permanent storage facilities are not available on the farm, the stack method offers a practical alternative. Stacking with a framework of poles, and well weighting the fodder are necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position with weighted wires.

NOTICE TO READERS.

Because of the present necessity for strict economy in the use of paper, readers are requested to renew their subscriptions promptly. If renewals are unduly delayed, it may be impossible to supply back numbers of the Journal.

Address all renewals and other correspondence to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Orchard Notes

MARCH.

THE COASTAL DISTRICTS.

IF the winter is favourable, all orchards, plantations, and vineyards should be cleaned up and the ground brought into a good state of tilth, so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations should be kept free from weeds, and suckering should be rigorously done. There is no greater cause of injury to a banana plantation than neglect to cultivate. Good, strong suckers will give good bunches of good fruit. Weedy, overcrowded suckers will only give small bunches of undersized fruit hard to sell, even at a low price.

Cooler weather may tend to improve the carrying qualities of the fruit, but care should still be taken to see that it is not allowed to become over-developed before it is packed; otherwise it may arrive at its destination over-ripe and consequently unsaleable. The greatest care should be taken in grading and packing fruit. Small or inferior fruit should never be packed with good, large fruit.

Growers who consider it necessary to deal with banana thrips are advised to apply to the Department for the latest information on effective procedure.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, shall be completed in the course of the month, and, as soon as the fruit is disposed of, plantations, which are apt to become somewhat dirty during the gathering of the crop, should be cleaned up. All weeds should be destroyed, and if bladey grass has got hold anywhere it should be eradicated, even though some pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be surface-worked and brought into a state of nice tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They may not be fully coloured, but they may be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered while still sour and green.

As blue mould may cause heavy loss in coastal citrus, especially in long-distance consignments, special precautions should be taken for minimising this loss. It should be remembered that the blue mould fungus will only attack bruised or wounded fruit; hence it is necessary to be careful that no injuries are caused by the clippers or finger nails during picking. Fruit should be cut and not pulled. Long stalks which may injure other fruit should be cut away.

The fruit should be carefully handled and accurately packed so as to avoid bruising. Any injured fruit should be discarded. In order to reduce the number of fungus spores present in the plantation, all waste fruit in the orchard or packing shed should be collected at frequent intervals and destroyed by fire or burying.

Fruit should be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The standard bushel case, the inside measurements of which are 18 by 11½ by 10½ inches, is the best for citrus. The fruit should be sweated for seven days before it is sent to the Southern markets, in order to determine what fruit has been attacked by fruit fly, and also to enable bruised or injured fruit liable to blue mould to be removed before despatch.

Growers are reminded that the control of the bronze orange bug is best achieved by spraying with the resin-caustic soda-fish oil mixture normally either late in March or early in April. Applied at this time of the year, the spray can give a mortality of 98 per cent. of the bronze bugs, which are then present solely in the very young stages. This spray also is very effective against several of the important scale insects infesting citrus.

Red scale is a pest to which citrus growers may shortly have to give attention, as it is considered that control is best established from the middle of March to early in April. Fumigation with hydrocyanic acid gas is most effective against red

scale, but success may also be achieved with white oils or with the resin-caustic soda-fish oil mixture evolved for the control of the bronze orange bug. Red scale, of course, is pre-eminently a pest of the hotter, drier citrus districts.

Strawberry planting may be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

THE advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be followed carefully. The later varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets. the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been published by the Department, which advice and instruction should enable growers to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes. Those who are not expert cannot do better than follow the methods of the most successful packers.

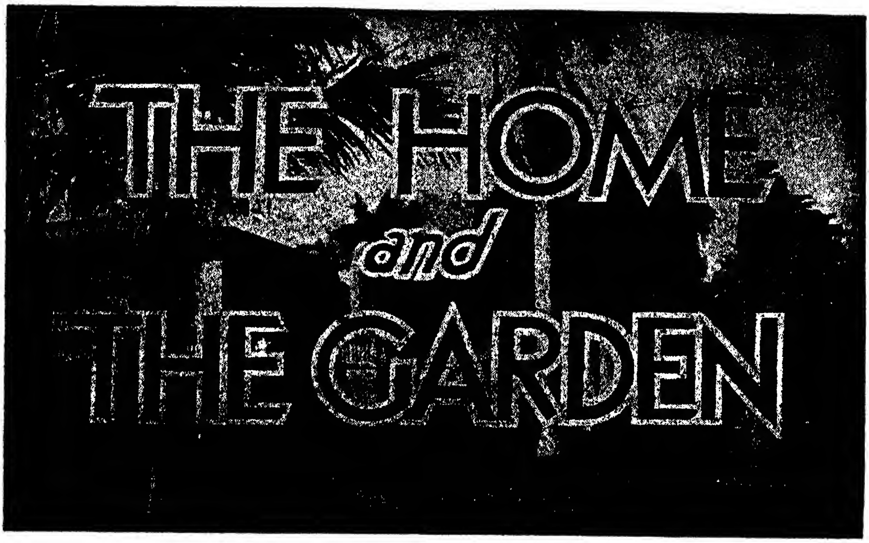
As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of the want of water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening stage, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much moisture is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light watering is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

[*Photo.: Lands Department.*

Plate 36.

A "ROLL" ON THE SKIDS.—Queensland's wealth in wood is well illustrated by these logs ready for rail transport to saw- and ply-mills.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

CARE OF MOTHER AND CHILD.

Other Common Errors in Baby Management.

Last month we talked to you about four common errors in baby management, namely, failure to put baby to the breast and giving artificial food during the first few days, thinking mother's milk "does not agree" and retaining the binder after the navel has healed with the object of supporting the muscles of the abdomen and back. This month we are going to talk to you about other common errors.

Thinking that mother's milk and cow's milk should not be given at the same time—this is a mistake that still persists in the minds of many. Not only is it true that mother's milk can be given with artificial food, but it enables the artificial or unnatural food to be more readily digested. It is worth while making use of even a few ounces of mother's milk which is available, and it is always possible that the supply may be increased. The value of retaining mother's milk is shown in the case of a young baby fed artificially and suffering from a digestive upset in which it becomes difficult to find a suitable food. A baby six weeks old was brought to the Welfare Centre suffering from malnutrition. The history was that the mother "lost her milk" after she returned home from the hospital. The baby was put on to an artificial food which did not agree with him. After he recovered from the upset, he was graded gradually on to another food. As soon as he reached a strength sufficient to maintain his weight, he had another upset which was accompanied by vomiting and diarrhœa. At this stage some breast milk became available and this was used in conjunction with a weak mixture of the artificial food. Progress was slow at first, but as his power of digestion increased, baby began to put on weight and his condition gradually improved. The mother had passed through an anxious time. Another mother was in great distress after returning home because her baby was crying a great deal. Thinking she was "losing her milk" she had given baby some artificial food. She was advised to attend the welfare centre, and within a week baby was fully breast fed and mother and child were happy.

Keeping the breast for the night is frequently done because the mother thinks that she has not sufficient milk for baby. If the mother's supply is deficient, it is important that baby should be put to the breast regularly and given his mother's

milk before he is allowed any artificial food. This is the best way of increasing the mother's supply. If it is not done, her supply will diminish rapidly and the baby will soon be weaned. A mother is frequently mistaken in thinking that her supply of milk is insufficient. If she is in doubt, she should consult a Child Welfare nurse at one of the Centres (Baby Clinics) either personally or by letter.

Thinking that if baby is not thriving, it is because the mother's milk does not agree—failure to thrive should never be attributed to the quality of the mother's milk. It may be due to underfeeding, overfeeding, or feeding irregularly. The baby who fails to thrive on his mother's milk is likely to do worse on artificial food.

A mother not infrequently says that her milk is too "thin and watery" and does not satisfy her baby. In a case of this sort the trouble is usually due to faulty management such as has been already indicated. An analysis of the mother's milk often shows that the so-called thin and waterly milk is quite as nutritious as the creamy looking milk.

It has been shown that while in some cases of leakage there is an over-supply, in others the supply is insufficient for baby's needs, the leakage being due to lack of tone in the muscle. The nurse at the Maternal and Child Welfare Centre will help you to correct the condition.

Cleaning baby's mouth may be done immediately after birth, but it requires to be done gently. It should not be repeated in the case of a healthy baby. Nature keeps baby's mouth clean until he has teeth and goes on to solid food.

The practice of giving castor oil to a new-born baby is still common. The practice is harmful. Doses repeated at regular intervals frequently cause constipation.

It is extraordinary how many people swing, pat, or jog a baby while nursing him. This habit is almost universal. When a child becomes accustomed to the movement, he expects it always. It may cause vomiting, particularly when it is done after a meal.

How often is baby touched or handled unnecessarily. If the mother does not do it, almost every visitor does. The child's cheeks may be pinched, his nose or chin pressed or his hands squeezed. People should learn to admire baby without handling him.

Why Baby Sucks His Fingers.

In a healthy infant the instinct to suck is very strong. Most babies put their fingers and thumbs into their mouths during the early months. It often occurs when baby is over tired and requires sleep. A mother should stand by ready to remove the thumb or fingers as soon as baby falls asleep. If thumb or finger sucking occurs at other times, it may be a sign of boredoom and an interest should be provided for baby. He should be given a bone ring or something else as harmless which he can handle, or his mother may attract his attention in some way.

You may obtain information on all matters about infant and child welfare by visiting the nearest Maternal and Child Welfare Centre (Baby Clinic), or by writing to the Sister in Charge, or by communicating direct with the Maternal and Child Welfare Centre, Alfred street, Fortitude Valley, N.1., Brisbane.

IN THE FARM KITCHEN.

PINEAPPLES IN THE DAILY DIET.

Few people now dispute the fact that fruit is essential to health. Medical research has abundantly proved that many cases of malnutrition are caused by the absence of fruit from the daily diet. Digestive disturbances leading to disordered blood conditions are common symptoms of this deficiency, and local medical men are strongly urging the greater use of fruit. All fruits supply juices that aid digestion and help to keep the intestines free from harmful bacteria, contain vitamins, minerals and easily-digested energy sugars.

The body cannot store some of the health factors required by it—they must be replaced every day, and this is why the pineapple should be a daily article of diet in every household. Two slices a day, fresh or canned, are all that is necessary. When the fresh fruit is plentiful—usually in the months of February, March, April and July, August, September, October—and if distance does not prevent it, fresh fruit can be obtained. For the rest of the year canned pineapple can be purchased.

Sir William Arbuthnot Lane, one of London's leading dietetic authorities, after exhaustive inquiries relating to the properties of canned fruits, said no considerable proportion of the mineral salts is exhausted; the juice has definite nutritive value, the vitamins are, in most cases, left intact, and in some cases actually intensified.

Pineapples are regarded as one of nature's health correctives and healers. Their richness in vitamin A helps to prevent common colds and those eye ailments sometimes prevalent amongst children. At the first sign of a cold or when colds are prevalent pineapples should be eaten freely. Being rich in vitamin B they promote body growth. Because of their vitamin C content pineapples are recommended by doctors as a precaution against pyorrhoea which, according to the "Medical Press and Circular," is largely a dietary affection. Dr. J. R. Killian, an American scientist specialising in the study of nutrition, states that the fight against pyorrhoea and dental decay will be helped in the future by a liberal use of pineapple in the diet.

Pineapples are of great value in after treatment following tonsil removals and assist the stumps to heal. The pure juice is a proved reliable ferment for dissolving necrosed tissue in quinsy.

These benefits are available to all, as where the fresh fruit is unobtainable the canned pineapple—retaining as it does the properties of the freshly-picked fruit—may be used.

Its uses in the kitchen are many. Slices fresh or canned, served with cold meat, have an appeal which ensures their continued use, particularly with corned meat. To the busy housewife the pineapple presents an easy solution of the ever-present dessert problem. No dish is more quickly prepared or more appetising than grated pineapple, fresh or canned.

A fruit salad can be rapidly made by the use of pineapple, fresh or canned, and one or more of any fruits in season. For cooked desserts the pineapple may be served in a multiplicity of ways, and the following recipes are recommended:—

Pineapple Jelly.

Wash a good half-breakfastcupful of sago, put in a large jug with half-cupful water, 1 cupful sugar, 2 grated pineapples, and juice of 1 lemon. Put the jug in a pan of boiling water and stir until clear, then put in moulds until cold. Serve with custard or grated pineapple.

Pineapple Fritters.

Put flour in basin, add pinch of salt, baking soda and cream of tartar, the usual quantities to each pound of flour, 1 tablespoonful sugar, and 1 egg to each pound of flour. Mix all together with milk, or half milk and half water, to a nice batter, dip in pieces of pineapple and fry to a nice brown. Condensed milk may be used if fresh is not available for the batter, by mixing at the rate of 1 tablespoonful to a pint of cold water. This mixture of batter may be used for bananas, mangoes, or apples, or any fruit that is used for fritters.

Pineapple Pie.

Two cupfuls grated pineapple, 1 cupful water, 1 cupful sugar, 2 tablespoonfuls breadcrumbs. Line pie-dish with paste, mix pineapple, water, sugar, breadcrumbs, and yolks of 2 eggs, bake, and when cool beat up the white of eggs and put over pie.

Pineapple Turnovers.

Make a flaky pastry from 2 cups self-raising flour and half-cup dripping. Cut out shapes the size of a tea plate, put a spoonful of chopped pineapple and a little sugar on each fold, press over the edges of the pastry together, and bake in a brisk oven. The turnovers are better served with hot custard.

A delicious pineapple drink may be made in either of the following ways:—

Pineapple Syrup.

Keep the skins of your pineapples and boil slowly and well in plenty of water. Strain through cloth and add sugar to taste. This makes a delicious drink and retains all the medicinal qualities of the pineapple.

Pineapple Water.

Peel a medium-sized pineapple and cut it into pieces, pound it to a pulp, and mix with it 1 pint of boiling syrup and the juice of 1 lemon, and let it all stand covered for two hours; now strain, and add 1 quart of water, and ice.

ASTRONOMICAL DATA FOR QUEENSLAND

MARCH, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON. AT WARWICK.

Feb.	SUN. Rises.	SUN. Sets.	MOON. Rises.	MOON. Sets.
	a.m.	p.m.	a.m.	p.m.
1	5.44	6.24	8.9	8.10
2	5.45	6.23	9.0	8.46
3	5.46	6.22	9.51	9.23
4	5.47	6.22	10.42	10.2
5	5.48	6.21	11.33	10.43
			p.m.	
6	5.48	6.20	12.24	11.29
7	5.48	6.19	1.15	nil
				a.m.
8	5.48	6.17	2.5	12.18
9	5.49	6.16	2.54	1.11
10	5.49	6.15	3.42	2.7
11	5.50	6.14	4.29	3.7
12	5.51	6.12	5.15	4.9
13	5.51	6.11	5.59	5.13
14	5.52	6.10	6.44	6.18
15	5.53	6.10	7.29	7.23
16	5.54	6.9	8.16	8.29
17	5.54	6.8	9.4	9.34
18	5.54	6.7	9.56	10.38
19	5.54	6.6	10.49	11.40
				p.m.
20	5.55	6.4	11.44	12.37
21	5.55	6.3	nil	1.30
			a.m.	
22	5.56	6.2	12.40	2.19
23	5.57	6.1	1.36	3.4
24	5.57	5.0	2.32	3.45
25	5.58	5.58	3.26	4.24
26	5.59	5.56	4.20	5.0
27	5.59	5.55	5.12	5.35
28	6.0	5.54	6.3	6.10
29	6.0	5.53	6.53	6.45
30	6.1	5.53	7.45	7.21
31	6.2	5.52	8.36	8.0

Phases of the Moon.

6th March, First Quarter, 5.43 p.m.
13th „ Full Moon, 9.47 p.m.
20th „ Last Quarter, 12.51 p.m.
28th „ New Moon, 6.14 a.m.

"SCENES OF WONDER APPEAR IN THE SKY."

A COMET was discovered, some time ago, at Harvard. It has been increasing in brightness anu, according to calculations, it should become a spectacular object, probably before this is published. It should be seen in the dawn. It is moving in a very elongated orbit, which will soon carry it too near the sun to be seen.

We have watched the morning star, Venus, herald the morn for many months, until now the radiant planet is lost in the greater radiance of the coming sun. Mercury will be also in the brightening dawn, near Venus, on 3rd March. However, Mercury is rising in the morning sky, and by 25th March he will have reached his greatest altitude above the eastern horizon, 28 degrees at sunrise. As the planet is of south declination, he should be well seen as a brilliant star more than a quarter away from the horizon to overhead. Mercury moves quicker than any of the other planets, and should, therefore, be looked for a week or ten days before 25th March, and watched while he rises to his "greatest elongation" and then declines to the eastern horizon again.

ECLIPSES.

The full moon will occur, this month, on 13th March when she will be so nearly in line with the earth and sun that about one-third of the lunar disc will pass through the dark shadow which is thrown out into space by the earth to an average distance of 859,000 miles. About five minutes to 9 o'clock something unusual will be seen at the edge of the moon; slowly a dark bite will appear which will grow larger for an hour, after which it will retreat until by a little before 11 o'clock all sign of the moon's excursion into the earth's shadow will be gone. The moon will pass on her way in radiant beauty to Last Quarter and then, on 28th March to New Moon, when she will pass directly between the earth and the sun, causing a solar eclipse. At this time the moon is almost at her greatest distance from the earth, causing her to appear a little smaller than the disc of the sun, leaving a brilliant ring or annulus of sunlight around the black disc of the moon. This is known as an annular eclipse. Unfortunately, it will not be seen in Australia, for it begins well to the east of New Zealand, passing across the South Pacific and half of South America. Lima, the capital of Peru, will be within the eclipse track, which will extend across Peru and half way across Brazil. There will be a partial eclipse over all South America, New Zealand, and most of the South Pacific.

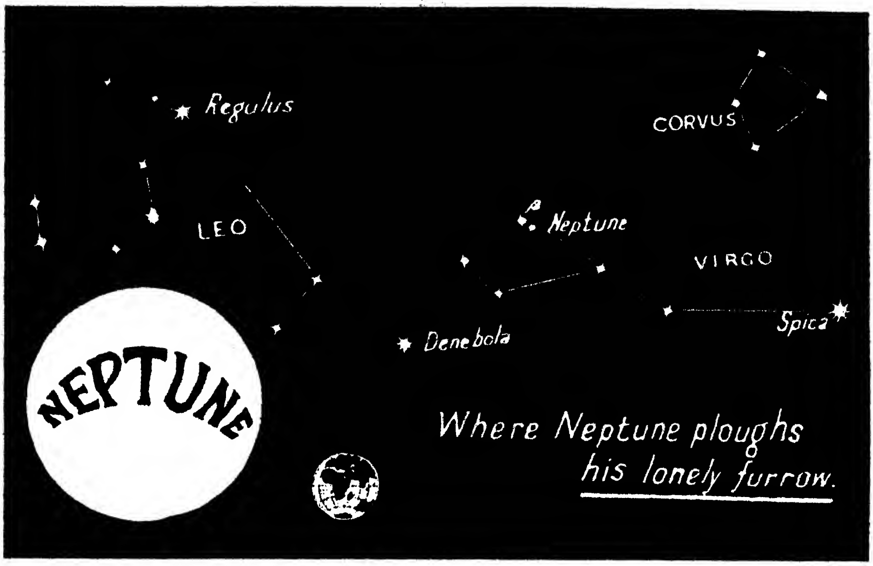
AUTUMNAL EQUINOX.

On 21st March the sun will have reached the equator on his way to take summer to the northern hemisphere. We have noticed the mornings and evenings drawing in already, but after the autumnal equinox this will be more noticeable. At the times of the equinoxes the day and night are of equal duration over the whole earth, and one may see the sun rise and set due east and west, which does not occur at any other time of the year.

The twin "stars" of the western evening sky, Jupiter and Saturn, are now parting company. They made their final bow to each other on 21st February. Jupiter will now move off to the eastward, leaving the slower moving Saturn behind. It will be about twenty years before they meet each other again.

This month, on the 17th, the distant planet Neptune will be in opposition to the sun, and, therefore, on the meridian at midnight. This far-flung world, for ever beyond the naked eyesight of man, may be seen in a telescope quite near the third magnitude star Beta Virginus, in the head of the Virgin. Out in the cold and darkness of space, 2,793 million miles from the sun, Neptune ploughs his lonely furrow, taking 165 years to get round the sun once. As he was only discovered seventy-seven years ago, he has not journeyed half round the sun since man knew of his existence.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 48 minutes.



The illustration will serve to show where Neptune will be at opposition, on 17th March. Looking due north, high in the sky, at midnight, the well-known figure of the Lion will readily be seen. Turn the map until Leo is oriented similar to the original Leo in the sky and all the other stars will be in their correct positions. Regulus, which means "little king," is in the handle of the sickle in Leo. From the centre of the curved blade came the wonderful Leonid star-showers every thirty-three years, but they failed in 1899 and have not appeared since. The ancients, who devised the starry figures, saw in the sickle the massive head and forepart of a lion, his fore paws outstretched. Behind the sickle is his body and tail ending in the bright star, Denebola. There are many Denebs among the star names and it always means "tail." It does not take much imagination to clothe this starry skeleton in a lion's skin.

The next zodiacal constellation is Virgo (only a part of which is shown. According to the Greeks this represented Proserpine, who brought spring and summer to the earth each year. Most old star maps show an angel bearing an ear of corn; the goddess of the harvest. Spica, the bright white star, means an ear of grain. Corvus, the Crow, consists of four stars of mag. 3. Sailors call it the "spanker sail," because of its resemblance to a spanker. The short side of the figure points almost directly to Spica.

There are many more stars than are shown, but those shown make an easy guide to the constellations and the position of Neptune.

The large and small discs show the comparative sizes of Neptune and the earth. At opposition Neptune is at his nearest to the earth, even then he is no fewer than 2,716,500,000 miles. From him the sun would have no appreciable disc, but there would be sufficient sunlight for visual purposes for eyes like ours, were there any there.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1939 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of years' records.	Dec., 1940.	Dec., 1939.
	In.		In.	In.
North Coast.				
Atherton	7·08	39	0·89	4·89
Cairns	8·46	58	1·38	1·04
Cardwell	7·99	68	0·12	0·81
Cooktown	6·46	64	0·44	0·99
Herberton	5·63	54	0·53	4·11
Ingham	6·69	48	1·53	1·81
Innisfail	11·38	59	1·25	1·55
Mossman Mill	9·70	27	2·05	4·37
Townsville	5·11	23	0·18	0·67
Central Coast.				
Ayr	3·86	53	0·07	2·58
Bowen	4·30	69	0·59	1·89
Charters Towers	3·18	58	1·10	1·59
Mackay P.O.	6·92	69	0·79	3·10
Mackay Sugar Experiment Station	7·74	43	1·06	3·44
Proserpine	7·31	37	0·36	3·38
St. Lawrence	4·64	69	2·35	3·26
South Coast.				
Biggenden	4·58	41	4·47	4·52
Bundaberg	5·08	57	5·27	9·90
Brisbane	4·82	88	7·82	3·28
Caboolture	5·11	53	10·76	3·80
Childers	5·59	45	7·30	4·82
Crohamhurst	6·98	47	9·10	2·52
Esk	4·59	53	7·61	4·52

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of years' records.	Dec., 1940.	Dec., 1939.
	In.		In.	In.
South Coast—contd.				
Gatton College	3·65	41	10·09	3·05
Gayndah	4·13	69	4·78	4·55
Gympie	5·37	70	6·05	5·02
Kilkivan	4·49	61	2·87	3·56
Maryborough	5·00	69	3·94	4·24
Nambour	6·53	44	4·55	3·05
Nanango	3·75	58	8·57	3·77
Rockhampton	4·72	69	2·51	3·53
Woodford	5·40	53	3·62	4·13
Central Highlands.				
Clermont	3·74	69	2·61	2·92
Gindie	2·68	41	..	1·14
Springsure	3·20	71	2·98	2·90
Darling Downs.				
Dalby	3·31	70	5·07	4·90
Emu Vale	3·41	44	7·97	3·45
Hermitage	2·94	33	..	..
Jimbour	3·28	52	6·12	6·03
Miles	3·06	55	5·42	1·39
Stanthorpe	3·56	67	3·12	2·85
Toowoomba	4·42	68	6·17	5·98
Warwick	3·40	75	9·80	3·07
Maranoa.				
Bungeworgorai	2·77	26	..	0·90
Roma	2·50	66	4·05	1·43

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—DECEMBER, 1940.

COMPILED FROM TELEGRAPHIC REPORTS.

Divisions and Stations.	Mean Atmospheric Pressure. at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.					
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	..	90	78	95	24	72	3	44	7
Herberton	..	86	64	95	24	58	24	53	3
Rockhampton	29·95	90	72	100	22	68	16, 17	251	10
Brisbane	30·02	83	68	95	23	64	15	782	11
Darling Downs.									
Dalby	..	87	65	92	16	59	24	507	10
Stanthorpe	..	82	59	92	8	50	7	312	12
Toowoomba	..	77	61	84	3	57	25	617	14
Mid-Interior.									
Georgetown	29·88	98	73	105	25	61	24	271	7
Longreach	29·86	103	74	113	20	64	2	164	4
Mitchell	29·92	92	68	100	4, 16	53	24	414	9
Western.									
Burketown	..	97	77	106	25	70	12	191	5
Boulia	29·79	105	76	113	6	62	25, 26, 27	2	1
Thargomindah	29·84	100	73	112	19	62	24, 25, 26	..	..

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, One Shilling, members of Agricultural Societies, Five Shillings, including postage. General Public, Ten Shillings, including postage.

Vol. LV. 1 MARCH, 1941 Part 3

Event and Comment

Farming in War-time Britain—Stock Food Storage.

CHARACTERISTICALLY, the British farmer has accepted the fact that it is his responsibility to keep food necessities up to the nation and the field forces fighting by speeding up the plough at a rate at which it has never been done before. When the war broke out, plans for increased production were immediately put into operation and pressed forward, with strong and understanding authority behind the drive. The present year's production has been planned with an objective of breaking up 2,000,000 more acres of grassland, and, where and when practicable, cultivation, in season, will go on right round the clock.

In the British farmers' viewpoint, every occupier of agricultural country, more particularly in these days, holds the land in trust for the security of the nation, and the Government is doing its job of providing facilities for the fulfilment of that national trust. The fine spirit of the British farmer is expressed admirably in a letter received recently by this Department from a man who farms a large area in Scotland and is a noted breeder of Ayrshires. He says, *inter alia*: "It is a tremendous source of strength to us to know that the Dominions are so wholeheartedly with the Motherland in the time of need. Our one concern at the moment is to produce as much as possible. . . I venture the opinion

that in the future first place in our markets will go to the home farmer, the second place to the Dominions, and third place for greatly reduced quantities from foreign countries."

Referring to his own activities, this correspondent states: "My own policy is to do my utmost to improve my land by cultivation and fertilization; improve my equipment to reduce labour cost; and to increase my supply of home-grown feed, especially grass silage to provide winter feeding and bridge drought periods.

"I feel confident that Australian farmers could, at little cost and without further dairy acreage, increase their product 40 to 50 per cent. by the general use of grass silage. The fear of drought would pass away, and if prices at home decrease yield will make up the difference. I need not trouble to go into technical details. Your agricultural officers must have all the details which have been circulated through the British agricultural Press. . .

"You may think I am overstating the case for grass silage, so I will briefly detail my own experience. In 1939, I had one portable wooden silo of 35 tons in sections. It was an experiment, as indeed all the grass silos of 1939 were experimental. The results were phenomenal, and in 1940 I wanted to get twelve silos and to use them each twice, i.e., twenty-four silo stacks of 35 tons each. Unfortunately, because of the shortage of timber, I could not carry out my full programme, but I managed to get, in all, thirteen stacks, and this will save hay and feeding. Hundreds of farmers are trying it with all sorts of makeshift silos, and many are using a wire constructure lined with waterproof paper. The grass is cut when 6 to 10 inches long, tramped in the silo and sprayed with a mixture of molasses and water. This ensures the right fermentation and gives a very palatable product. . ."

Gum Trees.

TREES around a farm put a premium on its value. The soil may be no better than that of any other farm in a district, nor the acreage yield higher. The homestead and other farm buildings may be even poorer in construction than those on neighbouring properties, but if surrounded or sheltered by rightly chosen trees the farm takes on a greater value and the prospective buyer is willing to pay the premium. The trees make the farm desirable because of the sheer contrast between it and the treeless places around it. A farm is a place not only to make a living on, but to live on, and there is a world of difference between living and just making a living. The prospect of comfort, shade and shelter, garden and orchard have an appeal that a bare homestead can never give. As to the individual farm so to the whole countryside, trees make a difference that nothing else can. An ornate suburban dwelling transplanted cannot do it; neither can neat furrows on the straight or on contour curves; nor even fine stock. All, of course, are very important, but, from a distance they do not make a place conspicuous like trees; and they never can convey an impression of a complete and cosy home, with

all that it suggests of the contentment and happiness of the people living on the farm. One day, no doubt, most of us will understand that trees, as well as fine fat cattle, add beauty and dignity and worth to the home paddocks. Accordingly, *Gum Trees,* Mrs. E. M. Forgan Smith's recently-published work on our native eucalypts, is welcomed cordially as a notable and timely contribution to knowledge of our unique flora, and as "a tree lover's tribute to the beauty and utility of our forests."

In the course of a beautifully written preface, the author says: "Trees are like people. When unfamiliar we are uninterested, but when we know their names, where they live, what they do, when their appearance has altered, and other details of their existence, our interest is awakened. We are pleased to greet them and tarry awhile. And so it is among the trees. . . Where previously the bush was regarded only as a retreat, it now also becomes a familiar friend; we have a better understanding of it, and are in more intimate touch with forest life.

"Is there an Australian who has not at some time felt moved by the beauty and grandeur of the eucalypts? They form about three-quarters of our vegetation and are typically Australian, whether set in their natural environment (forests of densely-packed towering trunks, sentinels on ridge tops, massive guardians of river flats), or in cultivated avenues, or as ornamental and shade trees in parks.

" 'Gum' trees, as we usually call our eucalypts in Australia, are as peculiar to our own land as are the kangaroo and the wallaby, and we may only think of them as 'bush' trees and be slow to appreciate the value and beauty of this gift of nature. In other countries, however, eucalypts have been planted from Australian seed. I have been told that eucalypts grow in the formal town square at Gibraltar. In Algeria the oil-producing varieties have been cultivated, and the one time malaria-stricken Pontine Marshes, outside Rome, have been freed from the fever by drainage and the growth of eucalypts. They have also been cultivated in France and Abyssinia. In South Africa they are being grown to produce much-needed timber. . . In rebuilding California after the earthquake eucalypt seeds were forwarded from Australia, and wonderful results have been obtained. They are also grown in the warm districts of the Caucasus on the Black Sea coast of the U.S.S.R. The species known as *Eucalyptus globulus* (the Tasmanian Blue Gum) was planted at the Villers Bretonneux War Memorial in France. I have seen eucalypts growing in New Zealand, where they are highly regarded. . .

"Trees on mountains, plains, river and creek banks have an influence on rainfall and check soil erosion in its various forms. . . They also made windbreaks, shelter belts, are very useful in keeping silt out of dams, and in times of drought many species can be used for fodder."

The book contains a description of each species, its common and botanical name, and its timber uses. *Gum Trees,* which is beautifully illustrated, should find a place in every farm home library. All the profits from its sale are going to swell the patriotic funds of Queensland.

Water Blister Disease of Pineapples.

T. McKNIGHT, B.Sc., Assistant to Research Officer, Department of Agriculture and Stock.

FROM the first week in January to the last week in April of 1940, reports from the Committee of Direction of Fruit Marketing recorded losses due to water blister in Southern consignments of pineapples. In addition, investigation showed losses in factory fruit to be quite considerable.

In order to determine the reason for these losses the majority of growers whose fruit had been seriously affected during the period were visited, together with a number of growers who are consistently free from the disease. In all, forty-three growers were visited, their packing sheds examined, and their views on picking and packing technique obtained. It was found that growers suffering from water blister losses fall into three classes—

(i.) Those unaware of the cause of the disease and unacquainted with standard measures for its avoidance.

(ii.) Those occasional losers who are familiar with the disease and the factors influencing its incidence but who, through pressure of work at a critical time or other adverse circumstances, have neglected to use their normal caution.

(iii.) Those more or less consistent losers who are familiar with the disease but who consider the now heavy task of reorganising their packing sheds to be impracticable.

As in past years, a definite correlation between picking and packing shed conditions and the existence of, or freedom from, water blister was quite evident. In cases where freedom from the disease was the rule it was found that the grower had followed Departmental recommendations either wholly or in part. One grower who follows Departmental recommendations faithfully, and uses benzoic acid-kaolin mixture as a stem-end dust, can send consignments to Adelaide in March without loss. Many growers completely avoid the disease by packing shed cleanliness only, coupled with careful handling.

One grower who had suffered severely in past summer seasons, particularly through the month of March, 1939, consented to the use of his packing shed in order to demonstrate the importance of hygiene. The shed was thoroughly cleaned out and sprayed heavily with formalin. A dump of decaying plant material was removed from immediately outside to a considerable distance away. The shed was again sprayed before each picking and no losses were suffered in subsequent Southern consignments. Prior to these operations losses were recorded in factory fruit. These were not repeated. The efficacy of these simple measures for the avoidance of water blister cannot be doubted.

Factors Influencing the Incidence of Water Blister Disease.

The obvious factors governing the incidence of water blister are—

(i.) The presence of pineapple refuse in and around the packing shed. This is most important, for the spores of the water blister fungus develop in huge numbers during humid weather on discarded suckers, tops, fruits, and leaves lying in and around the shed.

(ii.) The condition of the fruit with respect to the presence of wounds, providing invasion points for the fungus. Such wounds are commonly of the following types:—

(*a*) Side injuries or bruises received during handling.

(*b*) Sunburns.

(*c*) Knobs at base of fruit cut or knocked off.

(*d*) Cut or broken multiple tops.

(*e*) Growth cracks.

(iii.) The length of time elapsing before the fruit is actually on the market.

(iv.) Weather conditions prior to picking of fruit—

(*a*) Affecting the presence of the fungus; warm, wet weather, particularly, stimulates the rapid growth of the fungus.

(*b*) Affecting the fruit; wet weather following a dry period is frequently responsible for the production of growth cracks on the fruit.

(v.) Temperature and humidity during transport.

(vi.) Possible infection sites derived from injuries occurring subsequent to packing, as a result, for example, of slack packing or transport over unusually bad roads.

Measures for Control.

A review of the incidence of water blister disease indicates February and March as peak periods for losses, particularly the latter, but growers would be well advised not to relax precautionary measures over the extended period late December to the end of April. Consideration of all the factors influencing water blister disease shows that the following procedure should be adopted if the disease is to be avoided:—

(*a*) Practise strict hygiene in and around the packing shed, involving the constant removal of old planting material, discarded tops, &c., and complete disinfection of the shed, when warranted, with formalin, using a 2 per cent. to 5 per cent. solution.

(*b*) Use care in picking and handling the fruit. Bags are occasionally found in use and this practice should be discontinued.

(*c*) When weather conditions permit packing should be done on the headlands. In this way damage due to handling is minimised, but the necessity for strict sanitation still remains.

(*d*) Avoid, whenever possible, packing fruit while still wet.

(*e*) Avoid delays in transporting fruit.

(*f*) Rigorously exclude all sunburnt or otherwise wounded fruit from Southern consignments. Lightly sunburnt and slightly bruised or "weeping" fruit should be sent to the factory. Any discarded fruit should be collected and buried in the field and never allowed to remain in the packing shed where they invariably rot either with *Thelaviopsis* or yeasts.

(*g*) Second-hand cases which are suspected of being contaminated should be sprayed with a 2 per cent. formalin solution.

(*h*) If consistent attention is given to points (*a*) to (*g*) losses from water blister should be negligible or totally avoided. However, as an additional precautionary measure, especially when weather conditions are conducive to the development of the disease, the stem-ends of the fruit, prior to packing, may be dusted with a benzoic acid-kaolin mixture, prepared by mixing intimately one part of benzoic acid with four parts of kaolin.

Type of Fruit and Susceptibility to Water Blister Disease.

In view of the belief held by some growers that small, hard fruit are less susceptible to water blister than fruit which have received relatively heavy applications of nitrogenous fertilizers, fruit of both types were obtained from a fertilizer experimental plot in the Glasshouse Mountains district in order to make preliminary tests on this question.

Field inoculations were made with spore suspensions sprayed on freshly picked fruit, in each instance the same time elapsing from the picking of the fruit to the inoculation. Laboratory tests were made on fruit forwarded to Brisbane from the experimental plot. The results did not support the contention that fruit receiving heavy applications of nitrogen are more susceptible to the disease. In each trial the extent of the infections was greater in lightly fertilized fruit than in heavily fertilized fruit.

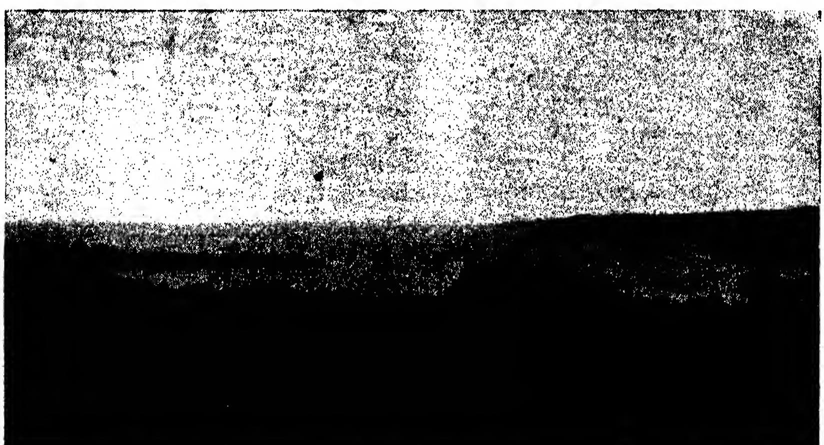


Plate 37.
MORETON BAY, NORTHWARDS FROM RUSSELL ISLAND.

Codling Moth Control.

D. O. ATHERTON, M.Agr.Sc., Research Officer.

CODLING moth is a pest of apples and pears at Stanthorpe where, in spite of the general application of control measures, losses are experienced every year. Research work on the control of this pest has been, and is being, carried out in the more important deciduous fruit-growing countries. The aim is in all cases similar, viz., to discover more efficient, yet economical, insecticides which are less toxic to human beings than lead arsenate and to improve methods of applying them so that unnecessary spray applications are avoided. Progress has been such that changes in spraying practices can be effected by growers in their annual codling moth control programme. These changes can best be discussed after a brief consideration of the insect and its habits.

LIFE HISTORY AND HABITS.

Several fruits are attacked, but for all practical purposes, apples and pears may be considered as the only important hosts at Stanthorpe. During winter the full-grown larva (Plate 38, fig. 2), which is about three-quarters of an inch long, lives in a very tough silken cocoon located in crevices of the bark (Plate 38, fig. 6) on the trunks and branches of the tree, in sheltered spots under the tree, and in the packing sheds. In spring the larvae turn into relatively inactive brown pupae, from which the small greyish-brown moths (Plate 38, figs. 4 and 5) with copper-coloured patches at the tips of the fore-wings later emerge, usually at the end of October. Then follow a few days of inactivity before the eggs are laid on apple and pear trees. Egglaying occurs at dusk on relatively warm evenings, each female laying approximately 100 to 150 scale-like eggs (Plate 38, fig. 1) over a period of about a fortnight. When the very small larva first emerges it may feed slightly on the leaves, but in a few hours it crawls to the fruit and chews its way inside, often entering near the calyx. When growth is completed within the fruit, the larva burrows its way to the outside and seeks a sheltered place in which to spin a cocoon. Pupation takes place within this cocoon, and the adult moth emerges later to continue the life cycle. Development in summer requires approximately seven and a-half weeks—egg, ten days; larva, four weeks; and pupa, two weeks.

The total period elapsing between the emergence of moths in the spring and the emergence of moths in the succeeding generation is approximately nine weeks. The second moth emergence takes place in the early part of January. These moths select either leaves or young fruits for egg laying. The very small larvae hatching from the eggs usually wander about for a short time before attacking the fruit, entrance to which is very often effected where two fruits touch or where a leaf rests on a fruit. Most of the second generation larvae will leave infested fruits towards the end of February or early in March and after spinning cocoons will over-winter in that stage. A small proportion, however, may pupate and emerge as moths before the winter, but these are usually of no consequence at Stanthorpe, for the bulk of the fruit is harvested before they lay their eggs. The periods required for the development of the egg, larval, and pupal stages varies a great deal. Consequently, the spring moth emergence may extend over two or three

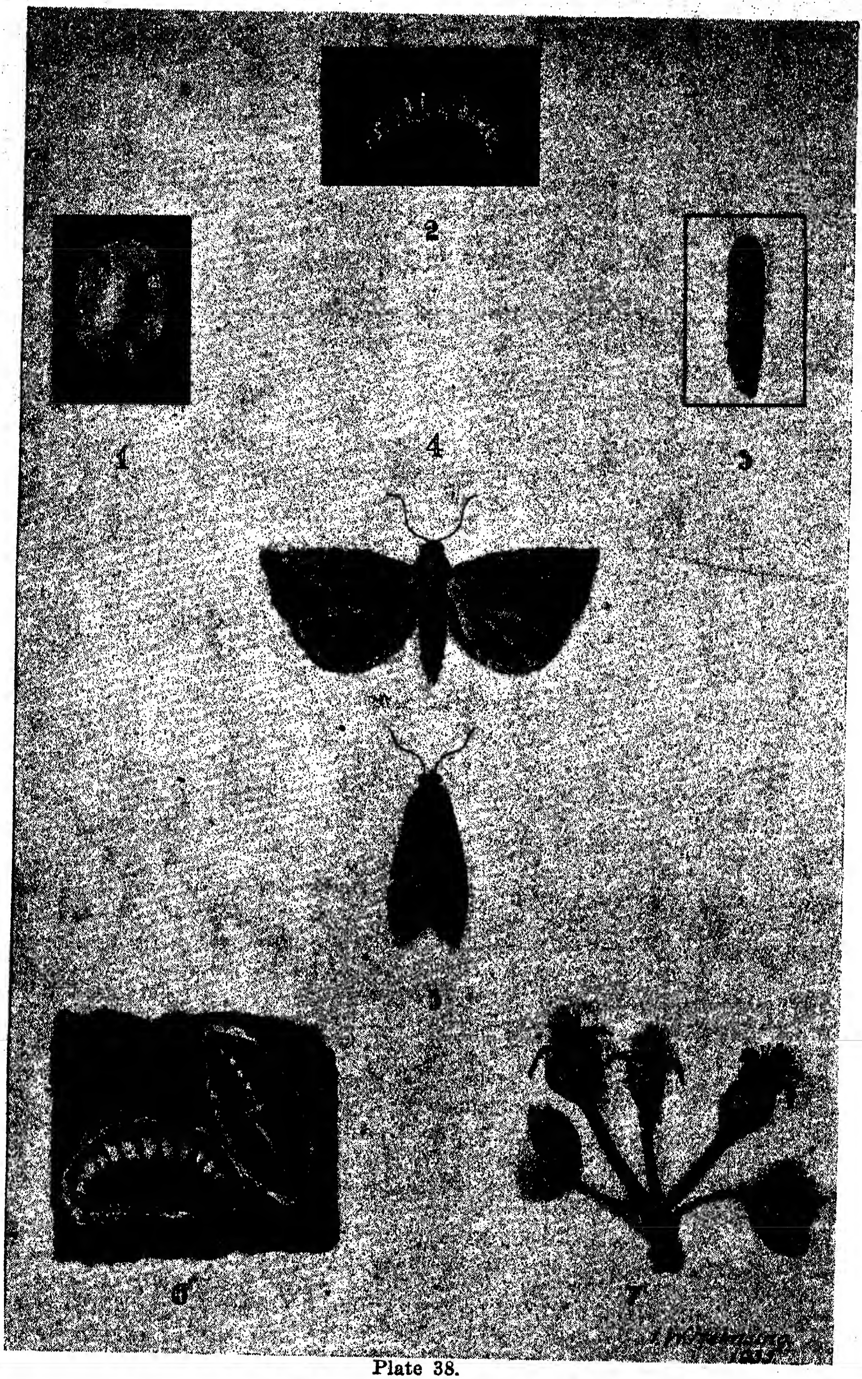


Plate 38.

CODLING MOTH.

Fig. 1.—Egg × 15.
Fig. 2.—Larva × 4.
Fig. 3.—Pupa × 4.
Fig. 4.—Adult with wings spread × 5.
Fig. 5.—Adult with wings folded × 5.
Fig. 6.—Larva and pupa in silken cocoons × 2.
Fig. 7.—Correct time for calyx spray.

weeks, the first summer emergence over a still longer period, and thereafter the pest is present in the orchard in all stages until the winter, when only the over-wintering larvae survive.

Control Recommendations.

Control recommendations may be considered from three points of view—(*a*) orchard hygiene, (*b*) tree banding, and (*c*) spraying.

Orchard Hygiene.

Over-wintering larvae should be destroyed wherever they are found —in the packing shed, in old cases which may be retained for the following season, in the crevices on the bark of the trees, on props which have been used for supporting branches heavily laden with fruit in the previous summer, and in any similar more or less sheltered positions frequented by them. This involves (*a*) a thorough winter clean-up both of the packing shed and its equipment, followed by the liberal use of waste sump oil or an insecticide of the oil group in cracks and crevices which cannot be otherwise penetrated, (*b*) bark examination and the destruction of any larvae found on the tree during pruning operations, and (*c*) the removal and burning of all rubbish both in the orchard and packing shed which is of no real service to the grower. The number of larvae spending the winter in the orchard buildings is apt to be high and, if allowed to complete their development, they aggravate the pest position in spring and tend to make control by orchard sprays more difficult.

Tree Banding.

Banding is the term applied to the practice of wrapping a 5-inch double-layer bandage around the trunk of the tree early in the summer and aims at the destruction of all larvae using it as a shelter for pupation. Bandages are of two types—(*a*) hessian, and (*b*) corrugated cardboard impregnated with beta-naphthol. The former must be removed from the tree every ten days during the summer in order to kill the sheltering larvae or pupae by boiling or by some similarly effective method. Properly used, hessian bandages are effective, but, unless the examination of the bandages is regular and thorough, they may do more harm than good. Corrugated cardboard bandages previously treated with a solution of beta-naphthol (1 lb.) in a mineral oil (1½ pints) are placed in position late in October. Their effectiveness gradually decreases, and in mid-January they should be replaced. The second lot of bands should be removed and burnt between early May and the end of September. Such impregnated bands are very attractive hiding places for fully-grown larvae descending the tree and kill most of them before they are able to complete their life-cycle. Chemical bands are more certain in their effect, though somewhat more expensive, than hessian bandages.

Spraying.

Really satisfactory control of the pest depends on the effective application of all available methods, but spraying is unquestionably most important. All sprays used for codling moth control are applied during the period when the trees are in active growth, and include one spray known as the calyx spray and a number of succeeding sprays known as the cover sprays.

Calyx Spray.—The composition and correct application of the calyx spray has been standardised for some years. The formula is as follows:—

Lead arsenate	2½ lb. powder or 5 lb. paste
White oil	¼ gallon
Water	80 gallons

The purpose of this spray is to minimise the fruit loss due to larval entrances through the calyx—a loss which is consistently high if it is omitted. The inside of the calyx cup and the persistent parts of the flower must be sprayed before the calyx has closed (Plate 39). If the spray is applied too early it will be less effective and may affect honey bees as they collect nectar from the flowers. Both risks can be minimised if the calyx spray is applied after the fruit has set, but before the calyx has closed. As the flowers do not all open at the same time, even on the one tree, each grower must use his own judgment, within the limits outlined, as to when the calyx spray is applied to his trees. Obviously, all varieties on any orchard are not ready to receive the calyx spray on the same date and programmes must be arranged accordingly. Occasionally, the period of blossoming is sufficiently extended in a single variety to warrant the application of two calyx sprays a week apart, but justification for such action is extremely rare at Stanthorpe.

Fig. 1. Fig. 2. Fig. 3.

Plate 39.

WHEN TO APPLY THE CALYX SPRAY.—Fig. 1. Too early—petals present. Fig. 2. Most suitable stage—sepals lifting, fruit beginning to swell. Fig. 3. Too late—calyx cup closed by lifted sepals.

Cover Sprays.—In the past, lead arsenate has been widely used in both calyx and cover sprays. It is reasonably effective and comparatively cheap, but it leaves a persistent deposit which has to be removed before the fruit can be safely marketed, and often causes extensive foliage scorching in the Stanthorpe district when a number of applications are made in the one season. An alternative non-poisonous insecticide is desirable for cover sprays and several have been introduced and tested in recent years. These insecticides are more expensive than lead arsenate,

but they are less harmful to the trees and contain no materials likely to create marketing difficulties. They are at least as effective, and in some cases more effective.

The following cover sprays are suitable for use in Queensland:—

I.	White oil	$1\frac{1}{3}$ gal.
	Nicotine sulphate	1 pint
	Water	80 gal.
	or	
II.	White oil	$\frac{1}{4}$ gal.
	Nicotine sulphate	1 pint
	Water	80 gal.
	or	
III.	White oil	$1\frac{1}{3}$ gal.
	Water	80 gal.
	or	
IV.	White oil	$\frac{1}{4}$ gal.
	Bentonite-nicotine (5% nicotine) ..	4 lb.
	Water	80 gal.

These four alternative cover sprays all give good control of codling moth if properly used. The first is the most expensive, but it gives the best control of codling moth, and is of value in checking woolly aphis, red mites, apple-leaf hopper, and scale insects. The second, though controlling codling moth and checking woolly aphis and leaf hoppers, has little influence on other pests. The third is effective against codling moth, and checks scale insects and the red mite. The fourth alternative cover spray is primarily a larvicide for codling moth control purposes, but successive applications may also keep leaf hoppers in check.

The relative importance of pests other than codling moth in the orchard, together with the relative costs of the various materials at the time of purchase, must be taken into consideration when deciding which cover spray to use.

Timing Cover Sprays.—A study of the life history and habits of the codling moth indicates quite clearly that there are certain periods of the year during which adult moths are more abundant than at others and, if suitable temperature and humidity conditions occur when the moths are numerous, they will lay large numbers of eggs on the trees. Codling moth cover sprays can be effective only if these eggs, or the young larvae emerging from them, are destroyed. Cover sprays must therefore be applied a few days after the period of greatest moth activity occurs.

A reliable method is now available for determining when the moths are most numerous in the orchard, and thus the problem of deciding when to apply cover sprays has been simplified. Codling moths, in common with numerous other moths, are attracted by various sweet or fermented liquids. A series of traps containing a cheap wine and water (wine 1 part and water 10 parts by volume) will, if placed throughout the trees in the orchard and examined regularly twice a week, give a reliable indication of moth activity. Glass jars with wide mouths and a capacity of about one quart make suitable lure traps, because any moths which sink in the lure can be easily found.

Every orchardist is in a position, by using lure trap records on his own property, to determine the most effective time for the application of cover sprays. Ten to twenty traps spaced among 100 to 200 apple trees should be sufficient to provide the required information for any one orchard. When the number of moths caught exceeds an average of one per trap and then diminishes at later examinations, a peak will have been recorded. The cover spray should be applied not earlier than the fifth and seldom later than the twelfth day after the recorded peak of moth activity.

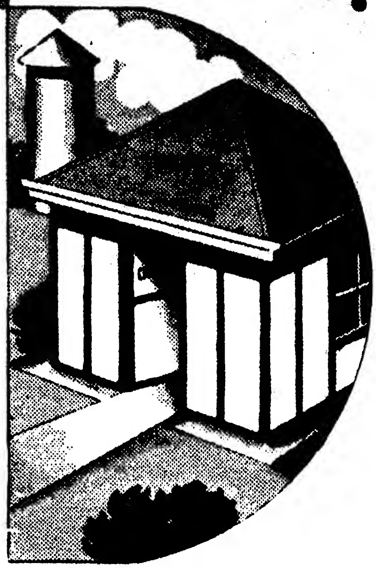
Lure trap records have been kept by officers of the Department of Agriculture and Stock from a number of representative orchards in the Stanthorpe district during the past three seasons. Fortunately, moth activity is much the same in all parts of the Stanthorpe district, and the data has therefore been used to prepare information on spray dates for the guidance of growers. Growers using such information should get good control of codling moth, but as minor differences in moth behaviour doubtless occur, it is desirable that the grower also maintain his own lure traps if the maximum precision is to be given to spray applications.

Fortunately, the habits of the pest and the efficacy of the sprays allow a period of at least a week during which cover sprays should be applied. The efficiency of the lure trap timing method is such that in some years a period of about eight weeks may be allowed to pass without any necessity for the application of a cover spray. Consequently, spray costs are reduced to a minimum by the elimination of sprays which might otherwise be applied for precautionary purposes.

Thorough Spraying.—Particular attention must be given to the thorough application of the sprays. To be effective, every cover spray must cover the leaves and the fruit. If the tree is large enough to require 2 gallons of spray for complete coverage, then it is certain that $1\frac{1}{2}$ gallons will not give good results, and any apparent saving in the cost of spray materials would be fictitious, for fruit losses would inevitably be higher than need be.

Plate 40.

A FRUITGROWER'S HOME ON MAGNETIC ISLAND, NEAR TOWNSVILLE, NORTH QUEENSLAND.



The Scrub Tick (*Ixodes holocyclus*)

F. H. S. ROBERTS, D.Sc., Animal Health Station, Yeerongpilly.

TICKS cause harm in several ways. Their bite is irritating and may in itself produce ill-effects. They live on blood and, when large numbers are present, the animal attacked may suffer severely from loss of blood. Again, many species of ticks transmit serious diseases. It is in this role as vectors of disease that ticks assume their greatest importance as parasites of livestock.

Of the several different kinds of ticks which attack livestock in Queensland, three are known to cause serious disease. The common cattle tick, *Boophilus australis,* transmits the organisms which cause tick-fevers in cattle. The poultry tick, *Argas persicus,* is a vector of the organism of spirochaetosis, a frequently fatal disease of poultry, while the bite of the scrub tick, *Ixodes holocyclus,* may result in a serious condition of paralysis in nearly all classes of livestock and man.

A B

Plate 41.
THE SCRUB TICK.—(A) Male. (B) Female.

Description.

The scrub tick is found in parts of Australia, New Guinea, and the East Indies. In Australia, its native hosts include the bandicoot and certain other marsupials such as the opossum, kangaroo, native bear, pouched mouse, and wallaby. It will also attack the cow, horse, pig, sheep, dog, cat, chicken, and man.

The male tick (Pl. 41 (A)) is oval in shape and yellowish in colour. It measures about $\frac{1}{8}$ inch in length. This sex does not increase in size to any noticeable extent during its lifetime. The female (Pl. 41 (B)), on the other hand, is capable of considerable distention. The young unfed female is yellowish in colour and about the same size as the male. As the female engorges, the body increases in size, eventually attaining a length of up to nearly $\frac{3}{4}$ inch, the colour changing to dark red.

At the narrow anterior end of the tick are the various structures which form its mouthparts. These consist principally of a pair of cutting organs and a club-shaped body armed with rows of recurved teeth. By means of the cutting organs a hole is cut in the skin into which the club-shaped structure is then inserted. This acts as a holdfast organ enabling the tick to maintain its position on the animal whilst feeding. The rows of recurved teeth on this holdfast organ prevent any removal of the tick by force which, if attempted, frequently results in the "head" of the tick being left behind in the flesh.

Distribution.

In Queensland, the scrub tick is to be found practically throughout the entire length of the coastal areas. In the southern parts of the State it has been recorded as far west as Warwick, Toowoomba, and the Bunya Mountains. It does not appear to be able to exist except under humid conditions and for this reason it is practically confined to scrub country.

Life Cycle.

Four stages are recognised in the life cycle of this parasite, namely, the egg, larva, nymph, and adult. As is the case with all ticks, the larva has only three pairs of legs, whereas both adult and nymph have each four pairs. The nymph differs from the adult in not being sexually mature.

When fully engorged with blood, the female tick drops from the animal on which she has been feeding and finds shelter in some crevice on the ground. After resting here for from eleven to twenty days, she commences to lay eggs. A single female may lay up to 2,500 eggs. In warm weather the eggs hatch in from forty-nine to sixty-one days. The larvæ that emerge become active after about a week and attach to the first suitable animal they encounter. The bandicoot appears to be the favourite host of the larvæ. After feeding for from four to six days the larvæ are fully fed, whereupon they drop to the ground. Here, after a period of rest varying from nineteen to forty-one days, they moult or cast their skins to emerge as nymphs. The nymphs become active after another seven days, attach to a host when opportunity offers, become engorged in four to seven days and then drop off. After a resting period of from three to ten weeks the nymphs develop into adults. These become active after about seven days. The female tick after attaching to a host engorges in from six to twenty-one days, whereupon she drops off and lays eggs.

Economic Importance.

Among its native hosts, the scrub tick is of little importance, but infestation of domestic animals, poultry, and man may incur a condition of paralysis, which is frequently fatal. In the case of the larger animals the disease is usually confined to the young, such as foals, calves, and children, but where the sheep, pig, dog, cat, and chicken are concerned, age is of little significance. Sheep and dogs appear particularly susceptible to tick paralysis.

Paralysis follows chiefly from attack by female ticks, a single female being capable of causing a fatal paralysis in even the largest dog. Every female, however, does not cause paralysis. Cases are also known of paralysis following a heavy infestation of nymphs, but these are of a comparatively mild type. The male tick and the larvæ do not cause paralysis.

Symptoms of tick paralysis are rarely seen before the end of the fourth or beginning of the fifth day after the female tick has attached. The cause of the disease is considered to be a toxin or poison which is pumped into the wound with the saliva of the female. The saliva is a secretion which has the property of preventing the blood from clotting while the tick is feeding. Female ticks feed only slowly at first and

then commence to engorge very rapidly. The onset of paralysis is coincident with the period of rapid engorgement by the tick, which causes a copious flow of saliva and also of the toxin.

The first symptoms of paralysis are to be seen in the hindquarters of the affected animal. The animal is unable to control the movements of its hind legs, which eventually become completely paralysed. The paralysis gradually extends to the forequarters. The animal now cannot stand and is unable to swallow or use its voice. Finally, the muscles which control breathing become paralysed and the animal dies.

Cases of tick paralysis occur chiefly in the spring and summer, particularly during wet humid weather. They can, however, occur at any time of the year for warm periods during the winter may be followed by cases of paralysis. If the weather is dry, on the other hand, the ticks usually remain inactive.

Control.

Dogs.—Dogs should be carefully examined every day and all ticks seen removed. Particular attention should be given to such parts of the body as in the ears, around the eyes, and in between the toes, where ticks are likely to evade detection.

Another method whereby the dog can be protected from attack is to dust the animal with derris powder, working the powder onto the skin, or wash it in an infusion of derris in water. This infusion is made by soaking 1½ to 2 oz. of derris powder in 1 gallon of water overnight or for about twelve hours. Before use, sufficient soap is added to produce a good lather. This wash should be used liberally and allowed to dry on the animal's coat. When using derris either as a powder or a wash, care should be taken to keep it out of the animal's eyes. As the wash will not enter the ears, and is not applied to the eyes, these parts of the body as well as the paws should be carefully examined and any ticks present removed. Derris powder may be applied to the inside of the ears.

Treatment with derris will kill any ticks on the dog and protect it from attack for about four days. As ticks must be attached for at least four days before symptoms of paralysis appear, *it is necessary to repeat treatment at least every seven days for an effective protection.*

Dogs suffering from tick paralysis should be treated by a qualified veterinary surgeon as soon as possible after the first symptoms are seen. The earlier an affected animal is given treatment the greater are its chances of recovery.

In areas where veterinary advice is not available, a supply of immune serum should be kept on hand and applied immediately symptoms appear. This serum is very successful, particularly in cases where the paralysis is not very far advanced. It may be secured from the Commonwealth Serum Laboratories, Royal Park, Melbourne. As supplies of serum have to be obtained from Melbourne and should be used early in the treatment of the disease, it is advantageous to have it on hand. The serum should be stored in a refrigerator.

Other Animals.—Treatment for tick paralysis in such animals as foals and calves is at present not very successful. In the case of these

animals, then, control measures require very careful consideration. If the following measures are adopted losses may be greatly reduced:—

(1) During periods of tick activity spray every seven days with the derris wash as given for dogs. In addition, such parts of the body as inside the ears and around the eyes should be carefully examined and any ticks present removed.

(2) Pastures running calves and foals should be cleared of all scrub and undergrowth which is likely to give shelter to bandicoots and other native hosts of the tick. If possible, also, such pastures should be securely fenced with netting to exclude bandicoots, &c.

Plate 42.

"THE SWIMMIN' HOLE," KINBOMBI GORGE, NEAR GOOMERI.

Maize Varieties for the Lockyer Valley, Part II.

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IN 1934 the results were published (1) of maize variety trials conducted at the Queensland Agricultural High School and College, Lawes, from 1925-26 to 1932-33. The trials have been continued and completed, and this record gives results of the work for the final six seasons. In two of these seasons the trials were lost, one through drought and one because of Wallaby Ear disease, while in 1938-39 two trials were conducted. Thus, there is a series of five results in addition to those earlier reported.

In general, the method of conducting the trials has not changed, the only difference being a progressive decrease in plot size to its final area of 1/110 of an acre. It is of interest to note that the "error" of the experiments has remained fairly constant throughout, so that reduction in plot size has facilitated field operations without lessening the efficiency of the work. In the last two years single seeds were planted 1 foot apart in the rows instead of using hills of three plants 1 yard apart as previously. All results are given on a uniform basis of 14 per cent. moisture.

For the season 1937-38 a perfect stand was obtained and no adjustments for stand differences were necessary. In the other trials yields had to be adjusted for stand differences, using the analysis of co-variance, on the basis of the regression obtained between yield and plant number at harvest. Significant positive correlations were found in every case.

Varieties and Seed Sources.

Varieties introduced into this series of trials since the last report are Funk's 90 Day, Star Leaming, and Reid's Yellow Dent (seed of which was obtained annually from the Queensland Department of Agriculture and Stock), and a selection of Leaming made and maintained at the College from seed originally obtained in 1931-32 from the New South Wales Department of Agriculture.

RESULTS OF INDIVIDUAL SEASONS.

Season 1933-34—

A trial was planted, but was destroyed by "Wallaby Ear" disease.

Season 1934-35—

Plan—10 by 10 Latin Square. Plot Size—Six Rows, 1 chain long.

Planting Date—26th November, 1934. Rainfall over Growing Period—17.31 inches.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Leaming (College)	41·56	4 *et seq.*	6 *et seq.*
2. Fitzroy (New South Wales)	40·49	6 *et seq.*	6 *et seq.*
3. Improved Yellow Dent (Queensland)	38·98	7 *et seq.*	9 *et seq.*
4. Kennedy (New South Wales)	38·45	8 *et seq.*	9 *et seq.*
5. Reid's Yellow Dent (Queensland)	37·63	9 *et seq.*	10 *et seq.*
6. Fitzroy (College)	35·90	10 *et seq.*	
7. Red Nib (Queensland)	35·37	10 *et seq.*	
8. Golden Superb (New South Wales)	35·15	10	
9. Star Leaming (Queensland)	33·21		
10. Funk's 90 Day (Queensland)	31·81		

S.E. of a mean treatment yield = 1.102 b.p.a. t = 1.994 (5 per cent.) or 2.648 (1 per cent).

Differences exceeding 3.11 b.p.a. are significant (5 per cent. point).

Differences exceeding 4.12 b.p.a. are significant (1 per cent. point).

Season 1935-36—

Plan—9 by 9 Latin Square. Plot Size—Six Rows, 1 chain long.

Planting Date—6th December, 1935. Rainfall over Growing Period—14.68 inches.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Fitzroy (College)	35·73	6 *et seq.*	6 *et seq.*
2. Leaming (College)	34·17	6 *et seq.*	8 *et seq.*
3. Reid's Yellow Dent	33·82	6 *et seq.*	8 *et seq.*
4. Star Leaming	33·75	7 *et seq.*	9 *et seq.*
5. Kennedy	33·50	8 *et seq.*	9 *et seq.*
6. Improved Yellow Dent	30·52		
7. Fitzroy (New South Wales)	30·43		
8. Funk's 90 Day	29·43		
9. Red Nib	28·83		

S.E. of a mean treatment yield = 1.159 b.p.a. t = 2.000 (5 per cent.) or 2.660 (1 per cent.).

Differences exceeding 3.28 b.p.a. are significant (5 per cent. point).

Differences exceeding 4.36 b.p.a. are significant (1 per cent. point).

Kennedy was discarded at this stage owing to weevil susceptibility.

Season 1936-37—

An 8 by 8 Latin Square was planted, but the trial was a total loss on account of drought.

Season 1937-38—

Plan—8 by 8 Latin Square. Plot Size—Six Rows, 1 chain long.

Planting Date—14th October, 1937. Rainfall over Growing Period—*13.48 inches.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Red Nib	26·8	2 *et seq.*	2 *et seq.*
2. Leaming (College)	21·8	5 *et seq.*	6 *et seq.*
3. Star Leaming	21·3	6 *et seq.*	6 *et seq.*
4. Fitzroy (College)	20·7	6 *et seq.*	6 *et seq.*
5. Reid's Yellow Dent	17·9	6 *et seq.*	6 *et seq.*
6. Improved Yellow Dent	10·9	8	8
7. Fitzroy (New South Wales)	9·9		
8. Leaming (New South Wales)	6·2		

S.E. of a mean treatment yield = 1.169 b.p.a. t = 2.201 (5 per cent.) or 2.704 (1 per cent.).

Differences exceeding 3.64 b.p.a. are significant (5 per cent. point).

Differences exceeding 4.47 b.p.a. are significant (1 per cent. point).

(*NOTE.—A period of twenty-five consecutive days in December-January with no effective rainfall and no effective rainfall from 2nd February to 21st March.)

Season 1938-39 (*a*)—

Plan—10 by 10 Latin Square. Plot Size—Four Rows, 22 feet long (1/110 acre).

Planting Date—6th December, 1938. Rainfall over Growing Period—*14.91 inches.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Leaming (New South Wales)	41·56	3 *et seq.*	3 *et seq.*
2. Fitzroy (College)	40·60	3 *et seq.*	3 *et seq.*
3. Leaming (College)	38·04	4 *et seq.*	5 *et seq.*
4. Star Leaming	36·86	5 *et seq.*	7 *et seq.*
5. Reid's Yellow Dent	35·64	8 *et seq.*	9 *et seq.*
6. Fitzroy (New South Wales)	35·38	9 *et seq.*	9 *et seq.*
7. Improved Yellow Dent	35·28	9 *et seq.*	9 *et seq.*
8. Red Nib	34·34	9 *et seq.*	10
9. Lester (Queensland)	33·00		
10. Funk's 90 Day	32·64		

S.E. of a mean treatment yield = 0.4 b.p.a. t = 2.00 (5 per cent.) and 2.64 (1 per cent.).

Differences exceeding 1.12 b.p.a. are significant (5 per cent. point).

Differences exceeding 1.49 b.p.a. are significant (1 per cent. point).

(*NOTE.—Only 5 points of rain fell in December and only 33 points in February.)

Season 1938-39 (*b*)—

Plan—10 by 10 Latin Square.

Plot Size—Four Rows, each 22 feet long (1/110 acre).

Planting Date—26th January, 1939.

Rainfall over Growing Period—19.04 inches.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Fitzroy (New South Wales)	41·8	4 *et seq.*	5 *et seq.*
2. Fitzroy (College)	40·6	6 *et seq.*	6 *et seq.*
3. Leaming (College)	37·2	6 *et seq.*	8 *et seq.*
4. Improved Yellow Dent	36·6	6 *et seq.*	8 *et seq.*
5. Leaming (New South Wales)	36·4	7 *et seq.*	9 *et seq.*
6. Lester	31·8		
7. Star Leaming	31·4		
8. Funk's 90 Day	30·6		
9. Reid's Yellow Dent	29·0		

S.E. of a mean treatment yield = 1.61 b.p.a. t = 2.00 (5 per cent.) and 2.64 (1 per cent.).

Differences exceeding 4.8 b.p.a. are significant (5 per cent. point).

Differences exceeding 6.0 b.p.a. are significant (1 per cent. point).

Season 1938-39—Composite of (*a*) and (*b*).

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Fitzroy (New South Wales)	43·32	3 *et seq.*	3 *et seq.*
2. Fitzroy (College)	42·4	3 *et seq.*	3 *et seq.*
3. Leaming (College)	37·2	7 *et seq.*	8 *et seq.*
4. Leaming (New South Wales)	36·58	7 *et seq.*	9 *et seq.*
5. Improved Yellow Dent	35·02	9 *et seq.*	9 *et seq.*
6. Lester	34·16	9 *et seq.*	10 *et seq.*
7. Reid's Yellow Dent	32·84		
8. Red Nib	32·46		
9. Star Leaming	29·52		
10. Funk's 90 Day	29·46		

S.E. of a mean treatment yield = 1.32 b.p.a. t = 1.976 (5 per cent.) and 2.609 (1 per cent.).

Differences exceeding 3.69 b.p.a. are significant (5 per cent. point).

Differences exceeding 4.87 b.p.a. are significant (1 per cent. point).

(Apparent discrepancies between this composite result and the two individual trials for this season are due to a lower regression of stand on yield in the case of the composite analysis. There was a highly significant effect of time of planting on varieties.)

SUMMARY OF RESULTS. (Table 1.)

(Bushels per acre—14 per cent. moisture.)

Variety.	1930–31.	1931–32.	1932–33.	1934–35.	1935–36.	1937–38.
Improved Yellow Dent ..	51·0	30·7	53·7	39·0	30·6	10·9
Fitzroy (New South Wales)	49·0	14·2	54·6	40·5	30·4	9·9
Fitzroy (College)	47·3	24·5	32·8	35·9	35·7	20·7
Leaming (New South Wales)	56·2	25·9	49·7	..	..	6·2
Kennedy	45·2	22·7	32·0	38·5	33·5	..
Golden Superb	43·1	19·5	28·7	35·2	..	..
Red Nib	..	..	36·7	33·4	38·8	26·8
Leaming (College)	..	..	..	41·6	34·2	21·8
Reid's Yellow Dent ..	..	..	..	37·6	33·8	17·9
Star Leaming	..	..	..	33·2	33·8	12·3
Funk's 90 Day	..	..	..	31·8	29·4	..
Annual Means	47·3	20·0	44·2	36·9	32·2	16·9

Variety.	1938–39.	Variety.	1938–39.
Improved Yellow Dent ..	35·0	Star Leaming	29·5
Fitzroy (New South Wales) ..	43·3	Funk's 90 Day	29·5
Fitzroy (College)	42·4		
Leaming (New South Wales) ..	36·6	Annual Means	35·4
Kennedy	..		
Golden Superb	..		
Red Nib	32·5		
Leaming (College)	37·2		
Reid's Yellow Dent	32·8		

Composite Results.

It will be noted that as varieties were shown to be inferior they were eliminated and new varieties introduced from time to time. Thus, the composition of the trials with respect to varieties varied from season to season. To determine the value of each variety used, groupings were made of all varieties which were tested together over a series of seasons. All such possible composites were made.

The method followed in the previous report (1) of using the annual means of each variety for analysis, a season being treated as a single block, failed to give any significant result. The method, therefore, adopted in this paper was to use every replication of every variety in each season, thus increasing the number of degrees of freedom available. This procedure is considered justifiable when the number of replications in each season and the number of seasons are both reasonably large, and, in this case, resulted in useful differentiation between varieties being made.

PERIOD 1930-31 TO 1934-35 (FOUR TRIALS), No. 1.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Improved Yellow Dent	45·8	3 *et seq.*	2 *et seq.*
2. Fitzroy (College)	41·1	4 *et seq.*	4 *et seq.*
3. Fitzroy (New South Wales)	40·3	4 *et seq.*	5
4. Kennedy	39·0		
5. Golden Superb	33·8		

S.E. of a mean treatment yield = 1.25 b.p.a. t = 1.978 (5 per cent.) or 2.613 (1 per cent.).

Differences exceeding 3.5 b.p.a. are significant (5 per cent. point).

Differences exceeding 4.6 b.p.a. are significant (1 per cent. point).

PERIOD 1930-31 TO 1932-33 (THREE TRIALS), No. 2.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Improved Yellow Dent	46·9	4 *et seq.*	4 *et seq.*
2. Leaming (New South Wales)	45·3	4 *et seq.*	5 *et seq.*
3. Fitzroy (College)..	42·8	5 *et seq.*	5 *et seq.*
4. Fitzroy (New South Wales)	39·6	5 *et seq.*	6
5. Kennedy	34·6		
6. Golden Superb	31·8		

S.E. of a mean treatment yield = 1.6 b.p.a. t = 1.98 (5 per cent.) or 2.62 (1 per cent.).

Differences exceeding 4.5 b.p.a. are significant (5 per cent. point).

Differences exceeding 5.9 b.p.a. are significant (1 per cent. point).

PERIOD 1930-31 TO 1935-36 (FIVE TRIALS), NO. 3.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Improved Yellow Dent	43·0	3 *et seq.*	3 *et seq.*
2. Fitzroy (College)	40·1	4	
3. Fitzroy (New South Wales)	38·3		
4. Kennedy	35·8		

S.E. of a mean treatment yield = 1.172 b.p.a. t = 1.979 (5 per cent. point) or 2.616 (1 per cent.).

Differences exceeding 3.3 b.p.a. are significant (5 per cent. point).

Differences exceeding 4.3 b.p.a. are significant (1 per cent. point).

PERIOD 1932-33 TO 1938-39 (SIX TRIALS), NO. 4.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Fitzroy (College)	38·5	4	4
2. Improved Yellow Dent	37·3	4	4
3. Fitzroy (New South Wales)	36·4	4	
4. Red Nib	33·4		

S.E. of a mean treatment yield = 0.975 b.p.a. t = 1.975 (5 per cent.) or 2.607 (1 per cent.).

Differences exceeding 2.7 b.p.a. are significant (5 per cent. point).

Differences exceeding 3.6 b.p.a. are significant (1 per cent. point).

PERIOD 1934-35 TO 1938-39 (FIVE TRIALS), NO. 5.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Fitzroy (College)	35·3	Not significant	
2. Fitzroy (New South Wales)	34·5		
3. Leaming (College)	33·3		
4. Reid's Yellow Dent	32·9		
5. Improved Yellow Dent	32·6		
6. Red Nib	32·0		
7. Star Leaming	31·6		

PERIOD 1934-35 TO 1935-36, 1938-39 (FOUR TRIALS), NO. 6.

Variety.	Bushels per Acre.	Significantly Exceeds	
		5 % Point.	1 % Point.
1. Fitzroy (College)	37·6	6 *et seq.*	6 *et seq.*
2. Fitzroy (New South Wales)	37·1	6 *et seq.*	6 *et seq.*
3. Leaming (College)	36·4	6 *et seq.*	8
4. Improved Yellow Dent	36·1	7 *et seq.*	8
5. Reid's Yellow Dent	35·5	8	
6. Star Leaming	33·2		
7. Funk's 90 Day	32·6		
8. Red Nib	31·8		

S.E. of a mean treatment yield = 1.056 b.p.a. t = 1.97 (5 per cent.) or 2.596 (1 per cent.).

Differences exceeding 2.9 b.p.a. are significant (5 per cent. point).

Differences exceeding 3.9 b.p.a. are significant (1 per cent. point).

PERIOD 1930-31 TO 1932-33, 1937-38 TO 1938-39 (SIX TRIALS), No. 7.

Variety.	Bushels per Acre.	Significantly Exceeds.	
		5 % Point.	1 % Point.
1. Fitzroy (College)	39·3	4	Not significant
2. Improved Yellow Dent	38·0		
3. Leaming (New South Wales)	37·6		
4. Fitzroy (New South Wales)	34·8		

S.E. of a mean treatment yield = 1.194 b.p.a. t = 1.976 (5 per cent.).
Differences exceeding 3.3 b.p.a. are significant (5 per cent. point).

SUMMARY OF COMPOSITE RESULTS. (Table 2.)

The composite results may be summarised thus:—

Variety.	Superior to.	Inferior to.	Class.
1. Improved Yellow Dent	8–11	..	Good
2. Fitzroy (College)	7–11	..	Good
3. Fitzroy (New South Wales) ..	7–11	..	Good
4. Leaming (College)	7–9	..	Good
5. Leaming (New South Wales) ..	10·11	..	Good
6. Reid's Yellow Dent	9	..	Fairly good
7. Star Leaming	..	2–4	Intermediate
8. Funk's 90 Day	..	1–4	Inferior
9. Red Nib	..	1–4·6	Inferior
10. Kennedy	..	1–3·5	Inferior
11. Golden Superb	..	1–3·5	Inferior

Red Nib.—Ears low, rather short and dumpy. Grain very variable, but generally deep, rough, starchy, and slightly dull.

The order of maturity (earliest to latest) has been—Red Nib, Funk's 90 Day, Reid's Yellow Dent, Star Leaming, Leaming (College), Improved Yellow Dent, Fitzroy College, Leaming (New South Wales), and Fitzroy (New South Wales).

The Relation of Climatic Factors to Yield.

An effort has been made to determine the relation of climatic factors, chiefly rainfall, to final yield. With cotton, in Queensland it is known that winter and spring rainfall plays an important part in determining yields. Martin and Hershey (2) have shown in Iowa that in the first thirty to forty days after planting most of the differentiation of structures and tissues in the maize plant is completed, and that the following thirty-five days are spent in the enlargement of already differentiated structures. Thus, in the first thirty-five days of growth the upper limit of yield is determined. They conclude that "it follows that influences which have stunting effects in maize plants tend to be most serious when they operate early," though they recognise "that unfavourable conditions and cultural methods during the later periods can render ineffective the advantages of a perfect structural organisation developed during a favourable formative period."

Accordingly, attention was paid to winter and spring rainfall, to rainfall thirty days after planting, and to rainfall in the 30-60 and 60-120-day periods after planting. As may be seen from the table below, these rainfall groupings do shed some light on the matter but

are not entirely satisfactory. It is, therefore, suggested that final yield in maize is governed largely by the incidence of unfavourable weather periods. Thus, a comparatively brief heat wave at a critical stage in the life history of the crop may be of greater importance in determining final yield than all the rest of the season.

Table 3.

Season.	Yield of Fitzroy and I.Y.D.	Rainfall Data.					
		June to Sept. 30.	Oct. 1 to Planting.	June 1 to Planting.	After Planting.		
					30 Days. Period 1.	30-60 Days. Period 2.	60-120 Days. Period 3.
	Points.	Points.	Points.	Points.	Points.	Points.	Points.
1. 1929–30	71	333	794	1,127	360	400	340
2. 1927–28	61	469	1,465	1,934	320	1,250	810
3. 1928–29	59	351	668	1,019	320	570	850
4. 1932–33	54	539	890	1,429	310	750	470
5. 1930–31	50	896	399	1,265	840	200	420
6. 1926–27	42	455	1,000	1,455	1,200	270	440
7. 1934–35	40	565	450	1,015	290	660	670
8. 1938–39*b*	37	395	1,234	1,639	290	1,210	280
9. 1938–39*a*	35	395	856	1,251	119	542	1,364
10. 1935–36	30·5	551	611	1,162	290	640	450
11. 1931–32	22	397	1,010	1,407	180	40	450
12. 1925–26	19	701	905	1,606	0	60	340
13. 1937–38	10·5	356	413	769	319	268	728
14. 1936–37	Loss	409	615	1,024	270	67	750

1. 1929-30.—Very favourable rainfall. No heat waves.

2. 1927-28.—Very favourable rainfall. No heat waves.

3. 1928-29.—Favourable rainfall. Twelve days of severe heat in the second period, immediately relieved by 2 inches of rain.

4. 1932-33.—First period was unfavourable but was preceded by a winter and spring with 12 inches of rain. A dry period of twelve days at the beginning of the second period was followed by 7 inches of rain over the second half of this period. Rainfall in the third period was scanty but well distributed.

5. 1930-31.—Planted after a long, dry period. Scanty rain, but regular in the first period, followed three weeks after planting by very heavy rains. This supported the crop during the subsequent twenty-seven consecutive dry days, which might otherwise have been disastrous. Rainfall in the third period was scanty but well distributed.

6. 1926-27.—Conditions for the first period were very favourable. In the second period there was no effective rainfall but moderate temperatures relieved the situation; 4 inches of rain fell in the first thirty-five days of the third period, followed by two completely dry months.

7. 1934-35.—Planted after a winter and spring of fairly low rainfall. Thereafter rainfall was well distributed, scanty in the first period and moderate in the second, with moderate temperatures.

8. 1938-39b.—Planted late in January after heavy rains, preceded by two very dry months. The first period was unfavourable but the second very favourable, and in the third rainfall was well distributed but low.

9. 1938-39a.—Planted after very favourable winter-spring rainfall. The first period was very unfavourable with twenty-six dry days and extreme heat; 1 inch of rain fell at the end of the period. The second period was no more favourable, but, after eighteen dry days with an extreme heat wave, 5½ inches of rain fell. Rain was plentiful in the third period.

10. 1935-36.—Planted after a moderate winter and spring rainfall. The first period was favourable and in the second period a severe heat wave occurred during a dry period of fourteen days, but ill-effects were lessened by good rains before and after this hot, dry spell. Scanty, well distributed rains fell in the third period.

11. 1931-32.—Planted after a good spring rainfall. In the first period a very hot, dry spell of twenty-two days occurred. After this 1 inch of rain fell. The last twenty-four days of the second period passed without rain and included two heat waves. The dry weather continued for a month after the end of the second period.

12. 1925-26.—Planted after a winter and spring of very heavy rainfall. The first and second periods were hot and dry, with groups of thirty-six, six, and twelve consecutive dry days. Rainfall was very low but well distributed in the third period.

13. 1937-38.—Planted after a dry winter and only fair spring rainfall. Fair conditions in the first period; in the second period fifteen consecutive dry days with a heat wave, followed by fifteen days with no effective rainfall. Heavy rain in the middle of the third period was too late for the crop.

14. 1936-37.—Planted after dry winter and spring. Rainfall very low and insufficient to maintain growth.

Discussion of Results.

The results in general confirm those previously reported—that is, Improved Yellow Dent, Fitzroy, and Leaming have maintained their superiority over other varieties tested. These varieties averaged about 42 bushels per acre.

It is often considered that early to midseason types are better suited to such moderate rainfall areas as the Lockyer, but the results over this series of fourteen years definitely establish the fact that higher average yields are obtained from the varieties with a fairly long growing season. Earlier varieties of the type of Reid's Yellow Dent and Funk's 90 Day may have a place when considered in relation to other farming requirements, but not if maximum maize yields are the prime consideration.

Variety trials in this and many other South-Eastern Queensland areas are complicated by extreme seasonal variability. Thus, the range in mean yield of Improved Yellow Dent, which was included in each of the twelve trials, was from 10·9 to 67·6 bushels per acre, while that of Fitzroy (New South Wales) was 9·2 to 73·6. Annual means (mean of all varieties) varied from 16·4 to 61·3 bushels per acre. The co-efficients of variability of Improved Yellow Dent, Fitzroy (New South Wales), and annual means were 41·8 per cent., 47·8 per cent., and 39.4 per cent., respectively. This high variability makes differences between varieties difficult to establish and also indicates the need for testing over several seasons before a result can be accepted. However, it is considered that the classification of varieties as given in Table 2 is sound.

Considering individual varieties, Golden Superb, discarded in 1935, is shown in composite analyses 1 and 2 to be definitely inferior to Improved Yellow Dent, Fitzroy, and Leaming. Kennedy, rejected in the following year, is also shown in analyses 1, 2, and 3 to be inferior to the same varieties. Kennedy is probably superior to Golden Superb, but it has not been possible to demonstrate this statistically. Golden Superb has red grain, while the grain of Kennedy is fairly soft and susceptible to weevil attack.

The other varieties tested in 1934 were retained until the conclusion of the trials. Composite analysis No. 4 shows Red Nib to be definitely inferior in yield. Analysis No. 6 establishes the inferiority of Funk's 90 Day and Star Leaming, while it leaves Reid's Yellow Dent in an intermediate position as the best of the mid-season types.

It is to be noted that the New South Wales strains of Fitzroy and Leaming while in reasonable seasons as good as the Queensland strains are definitely inferior in drought years. The Queensland strains are, therefore, to be preferred.

It must be emphasised that these results are only proved for the black soils of the Lockyer Valley. While it is expected that they will be capable of wider application, it is known, on the other hand, that some of the varieties which were unsuccessful here are quite useful elsewhere.

Summary.

In a series of maize variety trials on the black soils at the Queensland Agricultural College over a period of fourteen years (1925-26 to 1938-39) the varieties Improved Yellow Dent, Fitzroy, and Leaming have been shown to be the highest yielding of twenty varieties and strains tested. Reid's Yellow Dent has given slightly lower but satisfactory yields.

Contrary to some expectations, early varieties (3½ to 4 months) have, on the average, given low and unsatisfactory yields.

In the trials there was extreme variability from season to season, indicating that such trials need to be conducted over several seasons before the results are fully accepted. In these trials it is considered that sufficient seasons have been covered and the trials, in consequence, have been brought to a conclusion.

An attempt has been made to indicate the effect of conditions during growth upon yield.

The findings should be applied to other regions and other soil types with some caution.

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NOTE.—Supplies of pure seed of Improved Yellow Dent, Reid's Yellow Dent, and Star Leaming are maintained by the Department of Agriculture and Stock, Brisbane, and of Fitzroy and Leaming by the Queensland Agricultural High School and College, Lawes.

FARM MACHINERY.

Modern farm machinery is usually complicated, with many different yet interdependent working parts, which require close attention in order to ensure mechanical efficiency when it is brought into use in the field.

A breakdown at harvest time must be avoided as far as humanly possible. A detailed inspection of every part of the machinery before commencing operations is, therefore, essential. All loose bolts should be tightened, broken or worn parts replaced, bearings packed and adjusted where required, pulleys aligned, grease cups cleaned and filled, and belting overhauled and oiled. Castor oil is useful for making leather-work pliable, besides being a good lubricant for a bearing tending to run hot.

There also should be on hand an assortment of bolts, nuts, spring washers, lubricating oils, and graphite—the latter for mixing with water and painting the sprockets, chain belts, and cogs, for which it is far superior to oil.

Health and Nutrition in the Tropics.

DOUGLAS H. K. LEE, Professor of Physiology, University of Queensland.

(*Based upon a lecture to the Sugar Agriculture School, January,* 1941.)

To assist in the improvement of the conditions of settlement in tropical Australia by a study of the effects of working in hot climates was the chief research aim of the Department of Physiology, University of Queensland, as stated by Professor Lee in the course of his Inaugural Address in October, 1936. *This was made possible by his studies in London, America, and Singapore, following his early life in the tropical regions of Australia. The work was helped on by the equipment obtained for the Department of Physiology, partly through the direct assistance of the Government of Queensland and research funds provided by the National Health and Medical Research Council. This lecture forms part of a wider attempt to make available to the community in general the immediate practical benefits coming from this work. It is impossible to do much in one lecture, so Professor Lee has remained content to sketch the highlights, leaving details for later occasions.*—Ed.

The Stresses of Tropical Climates.

BEFORE setting out gaily to kill a dragon it is just as well to know that there is a dragon, where he lurks, and how big he is. So I must first make a list of the ways in which life in tropical climates puts a special burden on the body.

First, there are all the ordinary trials of life encountered anywhere. A few of these ease off a bit in hot countries, but, for the most part, they are always with us. It is important to realise this, for it often happens that the body, somewhat tired by the special demands of tropical life, has less reserve in hand to meet them. Pneumonia, heart disease, or appendicitis will not be any easier to fight when one is exhausted by hot weather.

Next come the more or less direct effects of hot climates upon the human body. I cannot discuss details here, but the living body is always producing heat and this heat has to be got rid of. In cold climates this is easy—the trouble is to keep it in. In hot climates, however, it may become very difficult. The human body has a number of tricks up its sleeve, so to speak, such as sweating, but these all exact their price. Moderate prices may not worry a body in reasonable funds of health, but the body has its ups and downs and there are taxes that even the rich find difficulty in paying. The collapse may come in a spectacular way—as an unexpected bankruptcy or as a slow, gradual decline.

There are three types of spectacular collapse. First of all there is heat stroke or *heat apoplexy.* This, fortunately, is rare. It is due to a very high rise of body temperature and is often fatal. It probably occurs only in old or sick persons, people putting forward a tremendous effort under severe emotional urge, or under very hot industrial conditions—such as in stokeholds. Next, there is the common *heat exhaustion.* For all practical purposes this is a condition of faintness brought about by heat, but helped on by other things—sickness, alcohol, overwork, worry, bad nutrition. The patient usually recovers by himself, but, if there is any other cause, it should be removed if cure is to be obtained. Thirdly, there is *heat cramp.* While rare in hot, wet climates it is by no means uncommon in hot, dry climates and in stokeholds, especially in a

man new to the conditions. Violent cramps in leg and body muscles are due to a loss of salt in the sweat, which has not been given back to the body. Extra salt in the food—or beer—will both prevent and cure.

The slower effects are less spectacular, but are probably responsible for a greater loss of efficiency because they are so slow and common. No one likes to "crack-up" and no one likes to have their employees "crack-up." Both decide to ignore it instead of looking for the cause and removing it. There are different types of complaint, though they fade one into another. Firstly, there is *general depression* or tiredness. Everyone suffers at some time, but if it becomes too frequent—I almost said a habit—it is worth examining. Prolonged overwork, bad surroundings, anxiety, or bad nutrition, combined with heat, are the usual causes. Next comes *mental instability* or neurasthenia. Too much or too little work is the usual cause, often combined with bad social conditions. The worrying type of person is, of course, liable to develop in this way. A *reduced capacity for work* is often seen. It is often not the really hard work that causes the most suffering, however, but the moderate grades of work for which the worker sets his own pace. A certain slowing up of work is probably inevitable and necessary, but this can easily degenerate into laziness. *Kidney and bladder stones* are said to be more common in the tropics, probably because less water is left over after sweating to be passed out through the kidneys.

Parasitic Diseases.

The third group of trials imposed by hot climates contains the special infectious diseases and parasites of tropical countries. To go into these would, of course, take many pages. They include the germ diseases like typhoid, leprosy, typhus (including many of the coastal fevers), dengue; the protozoal diseases like malaria, Weil's disease, amoebic dysentery; parasites and pests like flies, fleas, mosquitoes, hookworms, and filaria; and the fungi causing ringworms and prickly-heat. The prevention of these depends, very largely, upon the general hygiene described later on.

Social Conditions.

Only too often "tropical diseases" are dismissed as something caused by a germ and prevented by sanitation. On such grounds we often hear it said that Queensland has no tropical diseases. It is true that we have very little malaria and dysentery and no small-pox, yellow fever, plague, or cholera, but to say we have no tropical disease is just closing our eyes to facts. I have mentioned the diseases caused directly by climate; equally, if not more important, are the diseases—for they are diseases—caused by the bad social conditions so very often found in this land of ours.

Foremost amongst these social evils is isolation. So much of our population is scattered about in small groups of families, single families, or even single individuals. This cannot be helped in a primary producing State, but man was not made to live alone. Man has a brain above that of the beast, and, if this brain is not kept occupied, trouble must occur. The way in which trouble occurs will be different in different cases. Some people are said to talk to their hat on a fence post, others just lose interest, others get quite unbearable. With all this usually goes a growing carelessness about everything, including the simple rules for keeping

healthy. Isolation at any time is a strain, but in a hot climate it can be the very devil. Mental, moral, and physical carelessness—what, in the army, is called losing morale—grow on one very slowly and unnoticed and pave the way for all kinds of ill-health. Spaniards call it "mañana," Malays "tid'apa." Australians call it many things, but the net result is the same—lost opportunity—and we cannot afford to lose any opportunities, especially now.

Much has been said in recent years about the nutrition of Australian people—I have said much myself. This same isolation makes the nutrition of the country family a very difficult matter. It costs money to transport food to outback places, especially if they are off the railway lines. Speed of transport is also important, as most of the good foods are perishable foods, which must be eaten while fresh. There is also the other point of view, that people by and large do not properly realise what the best foods are or how to get the best out of them. We can, and are spreading this knowledge in the cities, and Queensland is well to the fore in this respect, but it is difficult to get at the small country groups. General weakness, lack of resistance, anaemias, nervous troubles, loss of appetite, and similar conditions, due mainly to poor nutrition, are far more common than they need be. From this list you will see that poor nutrition is not going to improve the body's attempts to cope with the climate.

Improving our Lot.

By this time you are probably getting impatient with this list of troubles, and saying to yourself, "All right, I suppose we aren't the best, but what can we do about it?" Here, again, I can, in the space available, only give you hints. To get the most into this space I am going to stop playing about and give it to you machine-gun fashion. If you are still reading, you must be interested—or have very little to do. In either case, you can "take it."

There are four types of self-help—personal hygiene, domestic hygiene, nutrition, community hygiene.

Personal Hygiene.—This is much more important than in colder climates. Frequent washing; regular bowel action; regular exercise, but not overdone; mental discipline to prevent slothful habits of mind and body; use of light, scanty clothing to allow the greatest amount of air to play over the skin and evaporate the sweat (this applies mainly to humid coastal climates); a sufficient amount of drinking water; avoidance of excesses of alcohol or venery.

Domestic Hygiene.—Liberal use of doors, windows, and verandas to allow the greatest amount of air movement (this again applies mainly to humid coastal climates); fitting of properly-designed ventilators and fans; thorough cleanliness throughout the house; plenty of light other than direct sunlight; careful disposal of all kitchen refuse, kitchen wastes, and stable manure; the most strict care in the use of lavatories and disposal of human excreta; protection of all food from flies at all stages of its use; the proper design of kitchens with regard to the sun, winds, ventilation, ceiling, and conveniences.

Nutrition.—Each day and, if practicable, in each meal include one foodstuff from each of the five classes of foundations food—meat, milk,

the dairy products, fruit, and vegetables. This is particularly important for children. To this advice add four rules:—

Rule 1.—Reduce the amount of protein and fat in diet in hottest months—one meat meal a day is sufficient for all except those engaged in the heaviest labour. Partially make up the quantity of food by increasing the use of potato, sweet potato, pumpkin, onion, peas and beans, salad vegetables, and juicy fruits (if available).

Rule 2.—Make sure of the vitamin content of the diet—whole cereals (wholemeal bread), citrus fruits, mangoes, papaws, dried apricots, prunes, guavas, rough-leaf pineapple. Dried peas soaked and allowed to sprout are a valuable source of vitamin C.

Rule 3.—Take plenty of fluid—water, milk, tea, fruit drinks.

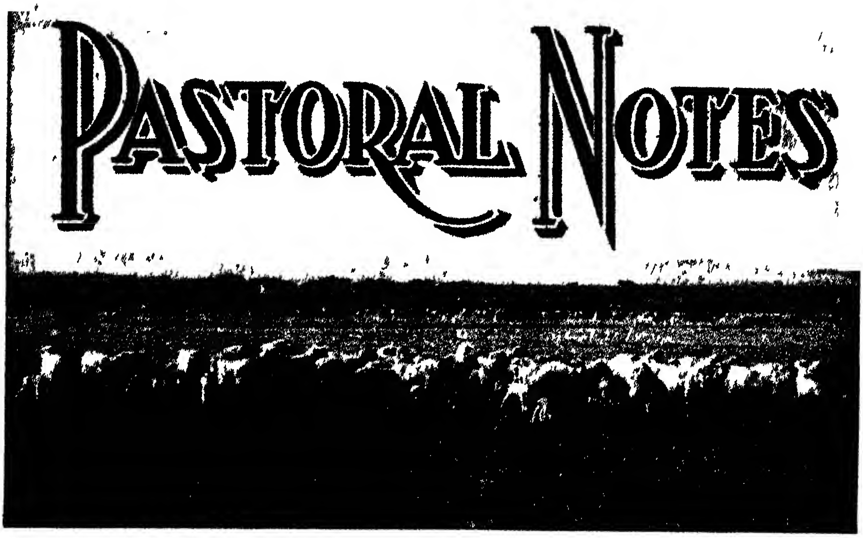
Rule 4.—Keep valuable foods from deteriorating—buy frequently in small amounts, store in a refrigerator, cooler, or wrapped in paper (or cellophane) in sealed tins.

Community Hygiene.—In large cities many of these necessary things are done for you and you do not think about the service—until you get the rate assessment. In the small villages, however, you have to depend very much more upon yourself and your duty towards your neighbour. When disposing of human excreta, burying is the usual way, but it must be *deep* burying if you and your neighbour are going to prevent typhoid, hookworm, and other diseases from starting or spreading. You would be a bit annoyed if someone left gelignite lying about, but typhoid can be just as destructive of life.

In big cities, again, it is easy to meet friends, play games, go to the pictures, but in the country you have to go to some trouble to arrange such things, but that trouble is very necessary—in fact, it does nearly as much good as the final pleasure you propose to have. Getting out of yourself, creating an interest, joining in with somebody else are very important antidotes for many of the ills that hot climates and isolation may threaten to bring your way.

Plate 43.

COOKTOWN TO-DAY.—This view accentuates the scenic attraction of Queensland's tropical coast.



Strangles.

THIS is an acute, contagious, febrile, catarrhal disease affecting horses, mules, and asses. Young animals are usually attacked and acquire an immunity which may be lifelong, although aged animals are sometimes affected, the disease following a mild course.

Strangles is caused by a streptococcus, which is found in the lymph glands and nasal discharges of affected animals.

There are two forms of the disease—simple strangles, which runs a relatively mild course of from three to four weeks, and a much more serious form in which the catarrh leads to broncho pneumonia and, at times, an abscess may burst internally and set up gangrenous pneumonia, or the organism infects the blood stream and sets up abscesses in the lungs, liver, spleen, and kidneys, causing death within a few days.

Simple strangles is characterised by inflammation of the upper air passages, evidenced by a cough with a nasal discharge, at first clear and watery, and, later, thick and yellowish, with fever, and abscess formation in the lymph glands situated in the angle of the jaws (submaxillary).

The eyes become reddened and discharge, respiration is increased, and the pulse later becomes rapid and weak. The animal is listless, with staring coat, and refuses food.

Treatment.—The patient should be made comfortable in an airy shed or box, and, if cover is not available, should be rugged and allowed to remain untied in an open yard, but in strict isolation from other young animals.

Feed should be offered in a box on the ground, and the appetite tempted with green staff, bran mashes, &c., in small quantities at a time, with water constantly available, to which may be added nitrate of potash—one ounce to three gallons of water which has had the chill taken off it in cold weather.

Discharges from the eyes and nose should be removed daily with cotton wool soaked in a mild disinfectant—such as peroxide of hydrogen, permanganate of potash, or boracic, in weak solution—after which the nostrils may be moistened with olive oil, which prevents discharges from drying around the parts.

Feed boxes and buckets should be kept disinfected and free from discharges.

The development of the abscess may be hastened by the application of hot fomentations, mustard poultices, or of weak biniodide blister, when it will usually burst spontaneously. If this does not happen the abscess should be opened with a sharp disinfected knife, selecting as a site for the incision a soft spot which will be found in the swelling. Too early surgical interference is not desirable. The contents of the abscess should then be squeezed out and the wound disinfected, and kept open until the discharge ceases.

With careful nursing and good feed recovery in most cases is rapid.

Preventive treatment consists of three inoculations with Commonwealth strangles vaccine at intervals of four days. Treatment of infected animals with this vaccine is valuable, but the services of a veterinary surgeon are necessary, as the dosage must be carefully watched and altered as indicated by the reaction of the patient.

DRENCHING OF HORSES.

Requirements for drenching horses—

(1) A good, strong bottle with a tapering neck, such as a beer or a methylated spirit bottle, or a "Champion" vinegar bottle is particularly suitable. In order to minimise the risk of breaking, a piece of hose may be fitted to the neck.

(2) A conical metal container. This being metal and having a reinforced neck is safer to use than a bottle. It should be about 1 pint capacity.

(3) A drenching bit. This is fitted in the mouth in the same way as an ordinary bit. The drench is poured into a funnel attachment and flows through the hollow bit, entering the mouth through a hole in the centre.

Drenching.—A quiet horse may be drenched without any restraint. The man at the head should have one hand on the horse's nose, to prevent the animal from throwing its head too high.

The person administering the drench keeps the head horizontal by applying the pressure to the lower jaw. The container is moved to and fro while in the mouth, thus causing movement of the tongue, promoting swallowing movement. The neck of the container should be kept just within the angle of the mouth.

The following points should be observed when drenching:—

(*a*) Do not hold the head too high, as there is a danger of the drench passing down the windpipe to the lungs and setting up pneumonia.

(*b*) Do not drench a horse when lying down.

(*c*) Do not drench through the nostril, as the greater portion of the drench will pass to the lungs.

(*d*) Do not apply pressure to the throat to force the horse to swallow.

(*e*) Do not drench a horse suffering with tetanus, or if affected with a sore throat or strangles, as then the animal may be unable to swallow.

(*f*) Do not put a horse to heavy work immediately after giving linseed oil, or, for that matter, any purgatives, as over-purging and death may follow.

DISPOSAL OF AGED SHEEP.

There is a growing tendency among small flock-owners to hold on to wethers until they become unprofitable. An average wether passes the age of usefulness and profit at five or six years, according to breeding. Apart from depreciated wool there is another reason for disposing of wethers before that age, and that is the added difficulty of fattening a sheep after it becomes broken-mouthed.

There should be a ready market for ageing sheep among wheat farmers. Cultivated crops are necessary to make marketable sheep which have fulfilled their usefulness as wool producers. It would be profitable, therefore, for the farmer to buy sheep of this class, because of the reasonable price at which they are usually obtainable, and a sound policy for the grazier to sell them for replacement with younger sheep.

Plate 44.
Off Shears—A Pastoral Scene near Dalby

RESTING STOCK BEFORE SLAUGHTER.

The importance of resting stock before slaughter cannot be stressed too strongly.

Considerable loss is incurred annually through partial and total condemnation of carcasses at slaughter-houses and bacon factories for bruised and fevered conditions resulting from the slaughter of animals immediately on their arrival.

Sometimes in the yarding of pigs whips or sticks are used, and a troublesome pig may receive quite a few hits before it is actually penned. Pigs are usually fat and soft and are, therefore, easily bruised. Very severe bruising, too, may be caused behind the jaws of pigs as a result of their having their heads jammed when they are being drafted into various pens. In such cases as these, where the pigs are slaughtered almost immediately upon arrival, the slaughtering inspector may find it necessary to remove large areas of bruised flesh from the carcass, and may have to remove the head and, perhaps, cut up high into the neck, almost to the shoulder.

Practically all such partial condemnations of pigs would be avoided if the owners of slaughter-yards made provision for spelling the animals a few days before slaughter, so that any bruising which may have occurred shall have time to vanish.

With cattle, it is also important not to have the animals slaughtered as soon as they have been delivered, more particularly if they have travelled long distances either by rail or road.

When cattle are trucked they may be bruised, either by the horns of other beasts or by bumping against the sides of the truck while the train is in motion. Likewise, when cattle travel by road they may arrive at their destination in a condition of semi-exhaustion, because of weather conditions and the distances they have been required to travel on the hoof. When these cattle are slaughtered immediately on delivery, the inspector has almost invariably to condemn a certain amount of meat, and sometimes a whole carcass, for fever or bruising.

These condemnations would, in most cases, be avoided if the cattle were rested for a few days after their journey in order that they may recover from an injury or exhaustion before they are slaughtered.

FLOCK MANAGEMENT.

Some flock-owners show a tendency at times to leave sheep too long in the one paddock. It is no rare thing, for example, to see sheep shorn, driven to a certain paddock, and left there until next shearing.

Sheep respond quickly to change of pasture, and the change is noticeable both in their health and condition.

A flock will often benefit, even if placed in a comparatively worse paddock than that on which it has been running for a brief period. On a breeding property, provision should be made for the ewes and lambs by spelling a paddock well before lambing time. Should rain fall while the paddock intended for the ewes and lambs is spelling, it is all to the good, as the succulent new growth so much to be desired for ewes and lambs will be in evidence. At weaning time there is again a necessity for fresh feed, for it should be fully realised that as a weaner a sheep is going through its most tender period. Grass seed country should be left severely alone where weaners are concerned.

HORSES EARN THEIR SALT.

A good farm horse is well worth his feed. Most farmers realise this, but all too frequently plough horses may be seen licking the dried sweat from each other.

Working horses are incapable of sustained effort without a liberal supply of salt, and when the food is low in this mineral they try to remedy the deficiency by licking the saline deposit from evaporated sweat round the collar, saddle, and other gear of a team mate.

It is, therefore, sound practice to keep rock salt in a convenient place for working horses.

EWES FOR FAT LAMBS.

The greatest handicap in the production of fat lambs on the Darling Downs in larger numbers has been, and still is, the difficulty of purchasing good crossbred ewes as the mother flock.

If a start has to be made with merinos, the best ewe for fat lamb raising is bred by the introduction of one of the long wools, such as Border Leicester, Lincoln, or Romney Marsh into the strong-woolled, robust type of merino ewe. The ewe lambs of this drop should then be retained as the future dams of the lamb-raising flock.

As to suitable ewes for the fat-lamb industry, it is believed that graziers on the fringe of the Darling Downs or further out would find it profitable to join long-woolled rams of British breed with their cast-for-age ewes with the idea of selling the progeny annually as fat lambs ewes on the Downs. Into the crossbred ewes flock, as described, should be introduced a ram of the Downs type. Opinions necessarily differ in the matter of crosses. The Southdown is the fashionable lamb at the present time, but it should be remembered that this cross must suffer no check from birth to block. The Dorset Horn gives a very nice lamb, early maturing and hardy. The use of the Border Leicester should be encouraged in every way. In addition to producing an early maturing lamb that fills every want, it must be remembered that the skin value of this lamb is worthy of consideration to a far greater extent than either the Dorset or the Southdown.

Pure-bred Corriedale ewes are hard to come by, but should the opportunity occur a farmer would be well advised not to let it slip. Pure Corriedales are hard to beat, good mothers and heavy milkers, besides growing a profitable fleece.

Generally, the wool from a flock retained for fat lamb breeding is a secondary consideration when compared with the production of fat lambs.

MERINO EWES FOR FAT LAMB RAISING.

Fat lamb raisers may be handicapped in their industry by the scarcity of the right type of ewe. This disability applies not only in Queensland, but, to a lesser degree perhaps, in all the other States.

In Queensland, 98 per cent. of the sheep are merinos. It becomes necessary in nearly all cases, therefore, to start breeding for fat lambs with ewes of this breed.

The grazier could help the fat lamb industry and, at the same time, obtain a profitable price for ewes culled for strength of fibre on his property by supplying suitable ewes to the fat lamb raiser. This applies especially where very strong woolled merinos are bred. There is nearly always a line of strong wool running to roughness when the type indicated is used.

The fat lamb industry can stand this roughness in the ewes, provided size and constitution are there, and both the grazier and fat lamb raiser would be well served—the grazier as to price and the lamb raiser as to type—if they could come to a business relationship.

The ewes described are really valuable to the farmer, but, unfortunately, are often slaughtered because of lack of realisation of their usefulness in the fat lamb industry.

A HORN-TIPPING TIP.

Much time and energy is often wasted in the practice of tipping the horns of cattle. Some owners of stock are slipshod in their methods of removing the points of horns. In doing the job, care should be taken to ensure that the cut does not slant. Oblique or slanting saw cuts defeat the object of the operation, for, although the tips are removed, sharp, chisel-like edges remain on the horns, leaving an animal still capable of inflicting a nasty injury to another. Even when cut squarely across, tipped horns remain capable of causing severe bruises. Horns with chisel-shaped points are a menace to all other animals within reach of their possessor, and, consequently, a probable cause of reduced profit to the stockowner.

Plate 45.

STORE CATTLE FOR TROPICAL COASTAL COUNTRY.—Some of a mob brought from the interior for fattening on Tully River pastures, North Queensland.

USE OF DIPPING FLUIDS.

Dipping is a routine practice throughout the heavily tick-infested areas of the State, and all solutions used contain arsenic as their base. No other substance has been found to equal arsenic in the treatment of ticky cattle.

The dipping solutions, which are used under Government control, and are applied to cattle moving from ticky to clean country, must, by law, contain 8 lb. of arsenic per 400 gallons of solution. It has been shown, however, that this solution has a reasonably wide margin of safety and that for all ordinary purposes a solution containing 6 lb. of arsenic is effective in the treatment of ticks. It is of interest to note that the South African authorities require a solution to contain just over 6 lb. per 400 gallons.

A cheap and effective dipping solution can be made up by using arsenic and caustic soda. Six lb. of arsenic require somewhere about 2 lb. of caustic soda to dissolve it. If the two ingredients are placed in the bottom of a drum, one on each side, and water added slowly with a cup or pannikin, and the two substances slowly mixed together with a stick, it will be found that the water commences to boil and bubble. This is due to a chemical action taking place between the arsenic and the soda and the former is soon dissolved. Water may then be added up to 400 gallons. A dipping solution such as this is very efficient and cheap.

If washing soda is used, is is necessary to boil the solution before the arsenic goes into solution. This, however, is a disadvantage as it takes time.

Where owners use caustic soda it is very necessary to keep the container closed very tightly so that air does not enter. If exposed to air, the caustic soda is changed chemically by the absorption of moisture, and sodium carbonate or washing soda is produced. Properly sealed containers prevent this.

WATER ON THE GRAZING FARM.

It is not every grazing farmer who is fortunate enough to have surface water on his property. Consequently, provision has to be made for water supply by bore drain delving, well-sinking, or tank-making.

Much money may be wasted in attempted provision of surface water. It is a common experience to see as many as three or four tanks, ranging in capacity from 1,000 up to 1,500 cubic yards, on a single property. These earth tanks provide water in good seasons, but may be quite empty when water is most wanted in a dry time. If the whole of the money invested in "pot holes" had been expended on one large tank, the supply would probably be adequate and permanent, more or less.

A mistake is often made by fencing a paddock and then trying to water it adequately. If, first, a large tank is excavated at a central site and country then subdivided for convenient watering money would be saved, security obtained, and value added to the property.

TALLYING SHEEP.

It may be taken as a fact that unless one is born with or has developed an aptitude for this work he will never make a first-class sheep counter.

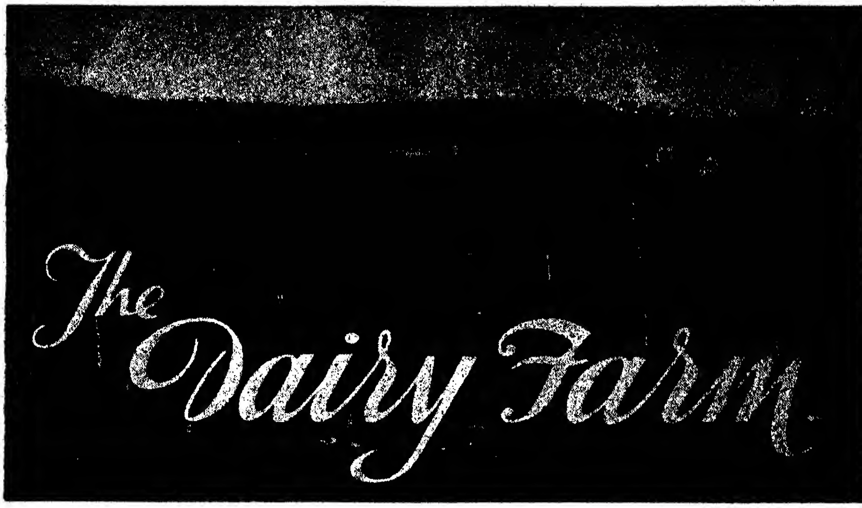
There are many methods of counting. The novice will try and count them singly as they come—one, two, three, four, and so on. This is a very slow process, and the gate has to be very narrow if an accurate tally is to be obtained.

Some count in twos—two, four, six, eight, and so on. This again is slow where big flocks have to be dealt with, and the sheep would be better on grass than in the break.

A successful method is to count in groups of three, one up to thirty-three, and let a single sheep go and tally 100.

It is astonishing to observe the speed and correctness of two good counters, one giving delivery and the other taking delivery.

It is a rare thing when two good men are engaged to see a check count, and this applies where thousands of sheep have to be correctly tallied. Constant practice is necessary to keep in form. To this cause may be attributed the fact that many drovers excel in counting sheep.



Washing Milking Utensils.

THE general principles underlying the proper cleaning of all metal milk utensils are very simple, and once understood they can be adapted to the requirements of individual vessels and apparatus used in dairying. For this purpose it is essential to understand something of the nature and composition of milk and its products. Milk is a complex substance consisting of water, butterfat, lactose, or milk, sugar, casein, albumen, and mineral salts. Cream contains the same constituents in different proportions, so that the problem of cleaning is confined to finding effective methods for the complete removal of fats, sugar, proteins, and salts.

The sugar and mineral salts, being mainly in solution, are almost entirely rinsed away in cold water, which will also remove a large part of the fat and proteins. Butterfat, however, occurs in the form of minute globules, and some of these adhere to the surface of milk vessels and require heat and emulsification before they can be washed off. Of the proteins, casein is in suspension in fresh milk (giving milk its white appearance), but it can be coagulated by acid or by rennet to form a solid curd, the hardness of which is increased by heating; albumen is in solution, but, like egg-white, it is readily and permanently solidified by the action of heat. Both these milk proteins possess considerable adhesive properties (casein is used commercially in the manufacture of paints and glues) and they will, *if the preliminary cold-water rinsing is omitted*, stick firmly to dairy utensils, where hot water washing and subsequent sterilisation will only harden them on to the surface. Once fixed there, even in a very thin film, they form a protective layer where bacteria become lodged and breed, and where the sterilising heat cannot reach them, to the detriment of milk and cream quality. Similar protection is afforded by a layer of fat in the form of grease, which can be tested for by passing a finger over the surface of dairy equipment, and which is caused by using insufficient hot water, water at too low a temperature, or the lack of some soap or soda compound to free the fat.

There are, then, three stages necessary to the thorough cleansing of dairy utensils, as distinct from the sterilising, which must follow in order to destroy the harmful bacteria. These three stages are:—

(1) *Cold Water Rinsing.*—Utensils should be well-rinsed as soon as possible after use. This is very important, for milk once allowed to dry is much harder to remove completely. Soaking in cold water for a reasonable time is advisable if washing is not to be done immediately—this will loosen all milk solids and facilitate washing.

(2) *Hot Water and Soda.*—Washing soda, caustic soda, soap, or soap powder are suitable cleansers for farm use (besides many proprietary preparations sold under trade names). Care should be taken to avoid cleansers containing any gritty substance, for this will permanently

damage the surface by scratching, and will rapidly remove tinning. The water should be really hot, and enough soap or soda should be used to emulsify the grease, so that no globules of fat can be seen floating on the surface of the water. A stiff brush should be used on each utensil, and all loose parts such as taps and strainer discs should be dismantled for scrubbing.

(3) *Hot Water Rinsing.*—A final rinse, using fresh hot water, is needed to remove the soda water before sterilising.

Milk utensils, if not properly cleaned and sterilised, are by far the most fruitful sources of contamination in the course of milking and handling milk and cream, and it should be remembered that both processes are equally essential, for satisfactory and complete sterilisation is not possible without first thoroughly cleansing along the right lines.

ARITHMETIC IN THE DAIRY.

Many dairy farmers supplying milk have cows capable of giving more than the one or two gallons they produce, but an owner is often sceptical as to whether the extra food required will be paid for out of increased production.

A simple trial lasting a fortnight will show how to rearrange both feed and production. Arrange for those cows which can be reasonably expected to produce more to get the extra feed. It should take the form of concentrates. A simple mixture for the production of an extra gallon is 3 lb. of maizemeal and of high-quality meat meal. Gradually bring the animals under test on to the full feed—usually a week is adequate. Test over a further week.

The cost would not exceed sevenpence daily per cow. The increased yield in terms of cash then determines whether the particular cows under test are worth the extra feed. If they are, then it may pay to pension off low producers and apply the cost of their food to the purchase of concentrates for the proved animals.

In practically all cases the food for two half-gallon cows or one one-gallon cow costs more than the extra feed which is to produce an extra gallon from a better milker.

The saving in labour also is worth consideration.

MILK STRAINING.

On the most carefully managed farm a certain amount of visible dirt finds its way into the milk. The term "visible dirt" covers such matter as dust, cow hairs, flies, and manure, as distinguished from bacteria, which are not visible to the naked eye. Bacteria may be present in milk which appears perfectly clean, fresh, and pure—and their presence may not be realised until souring begins several hours after contamination. If visible dirt is present in the milk, however, bacteria will be there also, hence the necessity for straining through a suitable strainer. The cotton wool disc type prescribed by the Dairy Regulations is preferable to any other. It can only be used once, and there is no risk of contaminating fresh supplies of milk, as sometimes happens with a cloth strainer which has not been properly washed.

It is better to keep visible dirt out of the milk than to strain it out. Early straining is better than last-minute straining, for to some extent the longer dirt is allowed to remain in the milk the greater will be the number of organisms passing into the liquid. The process may be understood more clearly by a rough analogy with making a brew of tea. If the tea leaves are removed soon after the addition of the hot water, the tea remains weak. If they are stirred in the teapot, or left for any length of time, the brew becomes much stronger. Similarly, if dust and dirt are left in the milk, undesirable bacteria, with which every particle of dirt is teeming, pass into the milk and increase the tendency to early souring.

The milk from each cow should be removed immediately milking is commenced and tipped through the straining disc into the receiving tank above the cooler. It will not require a second or even a third straining, for one straining, together with proper cooling, will be sufficient to give the milk a satisfactory keeping quality.

WET OR DRY MILKING?

Many dairy workers, careful in every other way to avoid contamination, still continue the unhygienic practice of wet-handed milking. Moistening the hands with milk direct from the teat or, worse, by dipping into the milk pail, is a deplorable habit, which is responsible for much contamination as well as loss of quality of milk and cream. It is, of course, more serious if washing of the udder and of the milker's hands have been neglected, for then the dirt becomes intimately mixed with and well distributed throughout the milk. A glance at the accumulation between the fingers of a worker engaged in milking an unwashed cow wet-handed will be sufficient evidence of the truth of this statement.

Where washing of the udder and teats and discarding of the foremilk have been carried out and the milker's hands have been washed, "wet" milking is less objectionable, but the fact remains that all the cleanest and most efficient up-to-date dairy farmers milk dry-handed, and this is a necessity for the production of milk for sale as "Tuberculin Tested" or "Accredited" in England, and for the majority of organised milkers' competitions. "Dry" milking means that the hands are washed immediately before starting to milk and after completing each cow, being left slightly moist after washing, and kept as free from milk as possible.

Some farmers, mostly those who have not persevered with dry milking long enough to give it a fair trial, object to it as being slow and difficult, especially as regards stripping. It has, however, been found by hundreds of others to be equally rapid and simple after a little practice, provided that the hands are left damp and the teats sufficiently moist after washing to make them pliable.

It is true that there are individual cows with badly-formed abnormal teats, or with one or more sore teats, which are difficult to milk dry-handed. For dealing with these, the clean milker uses a small quantity of ordinary vaseline applied to each teat after washing, which not only serves as a lubricant but also assists in the healing of the damaged skin, and helps to prevent particles being rubbed off into the milking pail. Teat sores should be treated with some antiseptic ointment between milkings. This also prevents their becoming more serious through being worried by flies. Great care should be taken by the milker to wash his hands thoroughly after each cow, for, obviously, this is a great factor in checking the spread of infectious sores, and the transfer of bacteria picked up from the cow's coat, leg ropes, stool, walls, &c., to the freshly-washed udder of the next animal. (If a towel is used, it should be changed often enough to make sure that it is an asset to the hygiene of the milking shed. The clothes of the milker may also constitute a source of danger to milk quality—if, for instance, the same clothes are worn for milking as for feeding the pigs, grooming the cows, and removing manure. A pair of overalls or a sugar-bag apron, kept for milking only, and washed out at least once a week, is within the reach of all.)

Vaseline may be found of assistance to the man who has made a long practice of wet-handed milking when he first attempts the "dry" method, especially in stripping. It is preferable to use vaseline if, by thus easing manipulation, it prevents excessive downward jerking of the teats, which is often resorted to by an impatient milker, and which is not only quite unnecessary, but ruinous to the delicate udder tissues. After a time, however, it will be found that dry milking can be carried out easily and rapidly with no lubricant other than the moisture supplied by washed teats and hands.

This is being done on hundreds of modern dairy farms, where greater efficiency and increased keeping quality are aimed at, and, once established, this method is seen to be far superior to the old, which appears unhygienic, messy, and insanitary by comparison.

SCUMMY CREAM.

It often happens that when cream is being put through the strainer into the vat at a factory, a quantity of thick, greasy substance is retained by the strainer. In most cases, this is due to the inclusion of the thick scum from the interior of the separator bowl with the cream. This is a practice which cannot be condemned too severely and results frequently in the cream being graded down.

ANTISEPTICS.

Antiseptics are useful in the treatment of a wound and can be applied in two ways:—

1. As a weak solution to wash out the interior of the wound.
2. As dressings impregnated with the antiseptic to absorb any discharge and prevent the further growth of germs. They also prevent contamination from outside sources.

Stockowners frequently use antiseptics at too great a strength, and do more harm than good. Some tissues are very susceptible to injury, and solutions should not, therefore, be used at more than the recommended strength.

Antiseptics are particularly valuable for cleansing the hands before touching a wound, and in concentrated form some can be used to sterilise instruments when boiling water is not available.

After shaving off the hair surrounding a wound, the skin requires treatment with an antiseptic solution before any surgical operation.

In emergencies, a wound should first be cleaned, then treated with an antiseptic, and protected from contamination.

Some common antiseptics are:—

Tincture of iodine—invaluable for immediate application to cuts and scratches.

Methylated spirits—used in undiluted form causes smarting, but has no ill effect on the tissues.

Permanganate of potash (commonly, though not correctly, known as Condy's fluid) can be added to boiled rain water to make a deep pink antiseptic fluid which is mild in its action.

Boric acid—a saturated solution is made by adding two teaspoonfuls to each pint of boiled rain water, and allowing the undissolved material to settle. A useful eye lotion can be prepared by mixing equal parts of the saturated solution and water.

Peroxide of hydrogen—an antiseptic and a deodorant. It is usually used at a 3 per cent. strength, and may be purchased as such. The stronger 30 per cent. solution must first be broken down to a milder form by adding 9 parts of water to 1 of the solution.

PEANUT RESIDUES FOR DAIRY CATTLE.

In preparing peanut residues for market, the shells, small particles of kernel, leaf and stalk or root attachments are separated and represent offal.

The shells and stalky parts are only low-grade roughage, but when, as often happens, the leaf and kernel fragments form an appreciable part of the bulk, the offal has a feeding value comparable with fair hay.

A sprinkling of water sweetened with molasses induces dairy cattle to eat their fill.

Dairy farmers seeking a cheap source of roughage are recommended to use the abovementioned product of a Queensland industry.

THE BULL RUN.

The bull should be kept away from the rest of the herd in a separate run securely fenced and provided with water and shelter. A small service yard and a crush to facilitate the handling of the bull when necessary should also be provided.

The advantages gained by keeping the bull away from the herd are:—

1. Calving can be regulated.
2. It is easier to decide whether or not the cow is in calf.
3. The bull's services are controlled and not wasted.
4. There is less likelihood of the cows having to return to the bull.

If the run is placed well away from a public road any annoyance caused by a neighbour's cows breaking into the bull or the bull breaking out is avoided.

Suppurative Ear Disease of Pigs.

SUPPURATIVE Ear Disease is one in which an abscess forms in the deep-seated portion of the ear. It is serious when it makes its appearance in a piggery because it interferes with an animal's ability to walk straight and to feed. It checks the rate of growth and may even cause loss of condition. Once established in a piggery it may affect many of the young pigs reared.

Cause: The cause of this disease is a special micro-organism which invades the throat producing an inflammation which spreads along the narrow passage connecting the throat with the middle ear and leading to an abscess in the latter. The pus formed presses on the organ of balance, which is situated close by, interferes with its function and so causes the characteristic symptoms.

A pre-disposing cause is the presence of catarrh of the nose or throat. This permits the ready entry of the organism through the tissues of the throat and so the disease is often seen in pigs which are suffering from disease of the respiratory tract; for example "snuffles," and "pants" (pneumonia).

Popular opinion is that the condition results from infection passing in through the ear, this being brought about by liquid foodstuffs, especially hot swill, being accidentally poured into the ear as troughs are being filled. This is not so; the disease commences in the throat and when a discharge comes from the ear it is because the abscess inside the ear has broken out through the ear-drum.

Symptoms: The symptoms of this disease are so characteristic that there can be no mistaking them. The pig holds its head to one side, usually with the snout somewhat raised, in an attitude that can best be described as "listening." It is the lower ear which is affected and at times it may show a discharge, but this is not always so. The animal is unable to walk in a straight line and may circle around making more than one attempt before it can reach the feed trough. Sometimes it will pass the trough on one side, sometimes on the other, apparently unable to judge direction.

Effects: The results of this disease are unthriftiness and lessened growth-rate, and so unprofitable pigs. It is obvious that any pig which is as consistently late at meal-times as these "listeners" will be unthrifty. Such a handicap is too great to allow it to compete with its pen-mates for its proper share of food; its growth-rate suffers due to this underfeeding and it takes months longer to reach marketable weights, so leaving little or no profit in rearing it. Meanwhile it has been acting as a reservoir of infection increasing the risk of other pigs catching the disease.

Treatment: There is no effective treatment for Suppurative Ear Disease as the condition is too deep-seated. Bad cases should be destroyed as they prove too unthrifty to be profitable. Other cases should be penned separately both to check the spread of the disease and also to enable them to be fattened by removing them from competition with sound pigs for food. Their disposal for slaughter as soon as possible is essential.

Control: This is a disease where the soil and surroundings become contaminated with the causative organism and so indirectly infect fresh subjects. It can be checked if not entirely eliminated by attention to hygiene and diet.

1. All affected animals should be isolated as soon as noticed, this applying not only to "listeners" but also to cases of catarrh and "pants." This isolation should be in pens well removed from the main piggery the drainage of which does not contaminate other pig pens or pastures.
2. All pens should be well drained and kept free of mud-holes, dung, litter, and rubbish. Most conditions favour survival of bacteria, and when the yards are kept free of rubbish they receive the full benefit of the drying, as well as of the disinfecting action of the sun's rays.
3. Feeding should be done from clean troughs, on clean concrete platforms, to reduce as far as possible the chance of the causative organism being taken in with the food.
4. Diet should be liberal and nourishing. Green feed is necessary to keep the membranes lining the respiratory passages in such a condition as to resist infection.
5. Good housing, provision of warm, dry, sleeping quarters, and protection from inclement weather, prevents much of the cold and catarrh which predisposes to ear disease.
6. Overcrowding is to be avoided since it not only predisposes to colds and catarrh but also hinders the maintenance of good hygienic conditions in the yards. Provision of fresh paddocks on clean, uncontaminated ground and the constant use of the rake and the shovel are steps to improving hygiene in the average piggery.

Finally, the provision of adequate good food, clean water supplies, exercise, and clean, dry, warm, sleeping quarters keeps the animals in the best possible condition to resist infections of any kind.

POINTS IN PIG FEEDING.

Grain feeding enters largely into successful pig raising; consequently, the form in which it is fed is important. Pigs which have been fully fed with corn through their growing period usually make good use of the whole grain, and corn-in-cob feeding may be adopted. Animals fed with corn only occasionally may not masticate it thoroughly, and a waste is incurred. For these, a preliminary cracking is advisable.

Well-ground grain is usually fed only to stud animals or stock for exhibition. The appearance of whole grain in the dung may induce pigs to eat excreta. This is a clear-cut case for grinding.

Milling by-products are usually fine, and this may be a disadvantage when the pens are in an exposed position or during windy weather. The waste may be considerably reduced by wetting.

There is no need to prepare pumpkins or squashes, beyond the breaking of hard-skinned varieties, e.g., ironbark pumpkins.

Most tubers may be fed as harvested, or the pigs may be allowed to harvest them for themselves. It is advisable to cook potato "culls."

Milk, milk products, seed cake preparations, meat and blood meals, and cereal by-products require no preliminary treatment.

Lucerne or other roughages are usually well masticated by older pigs, and young pigs eat such small quantities that there is no point in chaffing.

LITTER LOSSES.

Of all the difficulties with which the pig raiser has to contend, none involves such heavy financial loss as that associated with mortality in young pigs prior to the stage, and age, at which they are ready for market. Probably 25 per cent. of the average litter of pigs is lost before the weaning age (eight weeks).

The commonest cause of death before weaning is lack of attention at the time of farrowing, a number of pigs being suffocated at birth or killed by the sow. Premature birth also causes considerable loss.

It must be remembered that pregnant sows may be underfed and improperly prepared for farrowing in several ways. Lack of succulent green food, drinking water, mineral matter, readily digestible food, and also want of exercise are frequent causes of trouble at farrowing time.

The remedy on many farms lies in providing the necessary supplements to the food supply.

Strict limitation of the food supply a day or two before farrowing is necessary. Careful feeding, a clean, dry, nicely bedded pen with suitable farrowing guards and quiet surroundings in which the sow can settle down are very important.

Losses after weaning also are unusually heavy where management is slack. The period dating from the eighth to the twelfth week after birth is one of the most susceptible in the life of a pig. The system adopted should aim at feeding the young pig in such a way that there will be no check in growth before, at the time of, or after weaning. Care should always be taken to minimise the "shock" of the change over from the sow's milk to other foods by providing, for instance a separate pen in which the young pigs can feed apart from the sow.

The greatest check in growth results from the young pigs having to contend with older pigs at the feeding trough. Additional hindrances are overcrowding, filth, dampness, parasite infestation, and lack of clean drinking water.

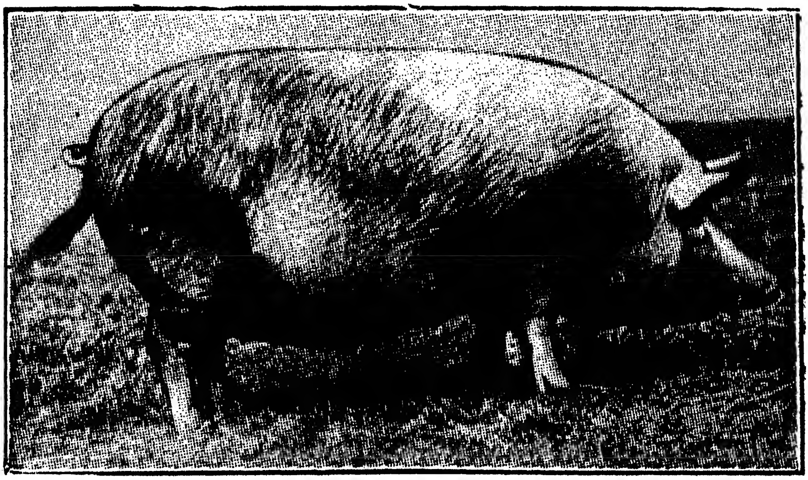


Plate 46.

THE MODERN TYPE OF TAMWORTH PIG.—A prize-winning sow carrying many desirable features, including light forequarter and small head, deep roomy body, well-proportioned hams and a deep level underline with well-developed teats. Note also fine skin and hair and evidence of careful breeding and development.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A GOOD BACONER.

The most important single attribute of a good bacon pig, provided, of course, the pig is in suitable condition and is very fleshy, is length of body. Measurements have shown that at about 120 lb. dressed weight, long-bodied pigs possess as thick, if not thicker, streaks of lean meat than short pigs. Lengthy pigs tend to have that leanness throughout which now is in such great demand. Long-bodied pigs have, generally, lighter shoulders than short pigs at the same weight. Undue length, of course, has disadvantages, but not as many as undue shortness, because the shorter pig always has a tendency to become overfat, while the longer pig carries more lean meat.

The framework of the pig tends to become coarser, and the hams not so fully developed, if the pig is kept growing. There is a tendency also for the flesh to be not so well proportioned throughout the thicker portions of the carcase.

It is false economy to hold pigs until they become over-fat.

MANGE IN PIGS.

Caused by a minute, worm-like mite which lives in the hair follicles and sweat glands of the skin, the condition described as demodectic mange in pigs is one which the pig-raiser ought to know all about, because its presence sometimes results in the de-grading of carcasses, especially of those submitted for export.

The mites are microscopic in size, measuring only one-hundredth of an inch in length.

The lesions of demodectic mange first appear, as a rule, on the snout, eyelids, elbows, and knees. In the initial stages, the areas attacked have a reddened, scurfy appearance with numerous small, hard nodules scattered over them. These become infected with bacteria and begin to ooze pus and serum. The disease gradually spreads over the throat, breast, abdomen, and elsewhere where the skin is soft and thin.

In its early stages demodectic mange may be checked by frequent applications of crude oil. The disease, however, is very difficult to cope with, and once it appears it is best to get rid of infected animals and to isolate all other animals which have been in contact with them for at least a fortnight. In addition, the sties should be cleaned out thoroughly with boiling water and soda, and then disinfected.

A CHEAP PIG OILER.

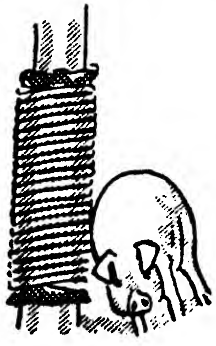


Plate 47.

To make a practical pig oiler, set a round post in the ground, leaving 3 or 4 feet exposed. Wrap with one or two old bags, then cover the bags with old rope, starting from the ground and working up. Be sure to fasten ends of rope securely and be sure the spirals of rope are wound tightly against each other. Saturate rope and bags with old crankcase oil and you have a practical oiler that will last a long time.

Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca.. ..	White Leghorns and Australorps
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, Rhode Island Reds and Whites
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
G. Grice, Loch Lomond, via Warwick	Kiama	White Leghorns and Australorps
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
Mrs. M. Grillmeier, Milman ..	Mountain View	Australorps and Minorcas
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, Junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah.. ..	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns, Australorps, and Rhode Island Reds
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Whitty, Boundary road, Kuraby	Witty's ..	White Leghorns and Anconas
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

EARLY LAYING PULLETS.

The marking of early laying pullets provides a practical method of selection where the trap nest is not used.

Records obtained by trap nesting in various parts of the world show that—

(1) Early laying pullets are, as a rule, the highest producers;

(2) Birds that lay late into the autumn and are late in moulting are also high producers.

As the early layers and late moulters are high producers, a marking system will assist in distinguishing between profitable and unprofitable fowls.

In one convenient system of marking, a coloured leg band is placed on the left shank of all pullets that start to lay before six months of age. A band of another colour is attached to the left shank of pullets starting to lay when six and seven months of age, and a third coloured band is used for fowls which commence to lay in the eighth month. Pullets that do not lay until after the eighth month should be eliminated from the flock, or kept in a pen by themselves, and forced for egg production.

Pullets which are early layers show the following characteristics:—

(1) A large red comb;

(2) An active disposition and a ravenous appetite;

(3) Roominess between the keel and pelvic bones;

(4) An occasional disappearance of the yellow coloration round the vent in some yellow shanked varieties.

In small flocks, individuals showing the above characteristics may be caught in the nest and then marked.

During the following season, all fowls that were marked as late maturing the previous autumn and moult in December, January, and February can be culled. All the early laying birds and those that moult after 1st March may be kept for layers or placed in a special breeding pen and mated to a male known to have come from a high laying hen that has been trap nested. In this way the egg production of the offspring may be raised.

The method outlined is simple and, if properly employed, will raise the level of production in a flock.

EGG PRODUCTION.

In breeding poultry the farmer should exercise the utmost care in order to establish and maintain a high-quality flock. Considerable progress has already been made in the improvement of breeding practice. Egg production has been increased from about 60 eggs to over 200 eggs per bird per annum, many individual pullets laying over 300 eggs in a year.

In dealing with the egg production in a flock of birds consisting of an equal number of pullets and hens, many authorities quote twelve dozen as a fair average annual production. It is doubtful, however, whether there are many poultry farmers in Queensland who obtain an average production per bird of less than thirteen dozen eggs yearly. In some experiments conducted at the Animal Health Station, using White Leghorns purchased from a poultry farmer as day-old chickens, the average production over the two years was 181 eggs per bird, the variations being—pullet year, from 194 to 209 eggs; second year, from 155 to 162 eggs. In these experiments 116 pullets were used, and the average of the two years was over fifteen dozen eggs, and even these birds in their second year laid over thirteen dozen. The birds were kept under poultry farm conditions.

The poultry farmer should be able to obtain an average production at least equal to those figures. A constant high average production is only obtainable by good breeding in conjunction with good mnaagement and feeding.

The chief considerations in establishing standards of good breeding are:—Type, constitutional vigour, action, and laying characteristics. Having selected birds reasonably true to type, care must be taken to see that they are of strong constitutional vigour. This is indicated by the vitality, stamina, health, brightness, and alertness of the bird, and is of equal importance to the knowledge of the actual number of eggs laid. As an example, some years ago the first three birds in a laying test laid 302, 296, and 294 eggs, respectively. An examination of these

birds at the conclusion of the test showed that the first and second birds were weak in constitution, whereas the third bird was very strong. All these birds were used as breeders, but while the progeny of the first and second hens were disappointing layers, the descendants of the third bird have performed very well in laying tests every year since. That example should emphasise very clearly the necessity for rejecting birds that are weak constitutionally.

Admittedly, it takes courage not to breed from a 300-egg bird. If such a bird produced the eggs without a heavy drain on her body she would be constitutionally strong. If, however, the bird rapidly loses condition during the year, she is obviously weak in constitution and, consequently, would probably be an indifferent breeder. Any bird that is unable to stand up to a heavy season's laying without losing condition cannot be expected to give high-laying progeny and should be discarded, irrespective of other characteristics.

FEEDING CHICKENS.

Feeding of chickens is important in maintaining size of body and the establishment of a flock of birds which will have the stamina to lay large numbers of eggs, and at the same time have the capacity to transmit the characteristic of egg production to their progeny. Attention to detail in the management and feeding of chickens is just as important as the ration fed.

Experiments conducted by the Department of Agriculture and Stock indicate a ration which gives excellent results, producing rapid growing, strong, vigorous chickens. The ration was are follows:—Maizemeal, 40 lb.; pollard, 20 lb.; bran, 20 lb.; dried buttermilk, 10½ lb.; meatmeal (containing bone), 7½ lb.; fine salt, 1 lb.; cod liver oil, 1 lb.

This was an all-mash ration and was fed in troughs in a dry state from the first meal until the chickens were eight weeks old. Grain or chick food was not given. Young succulent greenstuff is the only additional food that should be fed with such a ration.

The troughs or trays should vary in size in accordance with the number of chickens, but should be only about 1 inch high for chickens under one week old. From the first to the third weeks the sides of the troughs should be 2 or 3 inches high, and at least 4 inches high for older chickens. To prevent wastage, cut wire netting 1-inch mesh so as to fit loosely inside of the trough and place it on top of the mash. These troughs can be easily and cheaply made, and it is important that a number is provided for each lot of chickens, thereby ensuring plenty of feeding room. A good supply of feeding vessels allows the chickens to feed in comfort, thereby stimulating consumption and growth.

The old saying of feeding chickens "a little and often" has been lost sight of since the adoption of the practice of dry feeding. However, the continuance of this time-honoured practice is strongly recommended. It is advisable to have a bucket of mash in each pen and on every visit to the chickens to add a small quantity of mash to each trough. Chickens will immediately become interested and eat the fresh food.

A constant supply of fresh, clean, cool water should be provided in containers which do not permit of the chickens getting wet.

Grit in the form of coarse sand, or hard flint grit, also should be provided.

Agricultural Notes

Fodder Crops in the Maranoa.

THE last dry spell brought home to many farmers and graziers in the Maranoa the necessity for making full use of summer rains to provide a supplement to natural pastures and to accumulate reserves of fodder in order to avoid the stock losses that have been experienced.

This lesson has resulted in a wide-spread interest in the possibilities of sorghum and, in view of the confusion that exists both as regards nomenclature and the uses of the different varieties, these notes may assist in clarifying the position.

Nomenclature appears to be giving trouble, and there appears to be an impression in some cases that some sorghums are poisonous and others are non-poisonous. This is not so. The confusion appears to be due to a tendency to refer to the varieties of sorghum such as Wheatland Milo or Saccaline as something quite distinct from sorghum itself. This is perhaps inevitable because of the fact that the crop is comparatively new to the Maranoa district, and, to make the matter clear, the following simple classification of the sorghum group should be kept in mind.

Five main types may be considered. They are—

1. The grass sorghums which include Sudan grass and Johnstone grass.
2. The dwarf grain sorghums for harvesting with a header—e.g., Wheatland Milo, Kalo, Hegari.
3. Tall grain sorghum which includes Feterita and Milo.
4. Saccharine sorghum which includes Saccaline, Planters' Friend or Imphee, Italian, Amber Cane.
5. Broom millet.

It is emphasised that these sorghums are all, to some degree, poisonous at certain stages of growth, but any risks associated with the feeding of the green crop can be minimised by careful management and, in fact, the general experience to date does suggest that the value of these fodders far outweigh the risks. Stunted crops should not be grazed in any circumstances, and care should be taken to ensure that hungry stock are not turned in at any time. When the plants are well in head the danger has passed.

Sudan grass is the most favoured summer crop for hay, and good quality material can be obtained, provided that a fairly close spacing is used. If sown with a wheat drill through every run, fine-stemmed plants will develop which are, therefore, not only more palatable but cause less strain on the cutting mechanism of the binder and are easier to cure than the coarse stems resulting from wide spacing.

All varieties of sorghum will make a good quality silage, provided that the crop is cut at the correct stage and there is no delay in carting the material to the silo. Under the dry, atmospheric conditions of the Maranoa extra care should be taken to ensure that cutting is commenced when the crop is flowering. If grain is allowed to form, the material dries out too rapidly when cut and not

only is the resultant silage likely to be tough but also mould may develop because of the difficulty of excluding air when the material is being tramped down. Mould is, of course, objectionable in any circumstances, but this matter is of particular significance to the sheep grazier. Mouldy silage is especially fatal to sheep and the smaller animals may find it difficult to handle the tough material.

Although, as their name implies, the grain sorghums are primarily intended for grain production, they are quite suitable for feeding off when the grain has formed. Moreover, the stover or dry stalk which remains when the grain has been harvested is a useful standby and has an appreciable feeding value. The dwarf types are of proved drought and heat resistance, and this renders them specially valuable in the Maranoa where both phenomena are all too frequently encountered. From this it will be clear that, although varieties such as Saccaline may give and, in fact, have given satisfactory results where sufficient rain has fallen to ensure full development, as in the late summer of 1940, the dual value of the grain types as sources of both grain and green fodder cannot be neglected. Growers should, in fact, be warned against making wide generalisations as to the value of particular varieties, such as Saccaline, from the results of an exceptional season. Some varieties of feed sorghum are under trial in the district, and it is hoped that among these will be found a suitable tall-growing variety for feed alone.

Of the grain sorghums, Wheatland Milo or Kalo are recommended for the main planting and Hegari for late planting.

In view of the growing interest in silage, following the highly successful results achieved this year at Roma, Dulacca, and Chinchilla, it is stressed that it is a mistake to concentrate on one form of conservation of fodder. Silage gives best results when it is fed in conjunction with hay and grain. A more balanced ration is thus given, and a more economic and efficient utilisation of each type of feed is achieved. For this reason, all those who intend putting down silage during the coming season are urged to make provision for storing hay and grain. Sudan grass may be used for hay, but, by summer fallowing, it should be possible to establish winter fodders, such as Ford or Warput wheat, in March or April, and to utilise the crop partly for green feed and partly for hay. If, in addition, grain sorghum is harvested and the grain stored, there is no reason why any purchase of feed should be necessary during a drought.

The questions naturally arise—how much is to be stored, and what acreage should be set aside for conservation? It is essential that there should be sufficient for any probable requirements, and more harm than good is done if the fodder runs out before the drought ends.

Conditions will vary in each part of the district and in individual properties, but, as a very rough guide, the following basis might be worked out:—

Assume a ration of 2 lb. hay, 2 lb. silage, and ½ lb. grain per sheep—but, remember, that this is an assumption not a recommendation, and settlers should seek further information in regard to suitable rations in accordance with their individual requirements. Assume yields of 1 ton hay per acre, 6 tons silage per acre, and 20 bushels grain sorghum per acre. On this basis, the acreage required for 1,000 sheep for one month's feeding would be 25 acres hay, 5 acres silage, and 10 acres grain. Where dry grass of good quality is available, the amount of hay could be reduced, and, of course, yields of crops are subject to such wide variation that the figures given must be regarded as no more than a foundation on which to build up an estimate in each individual case.

THE SWEET POTATO.

The sweet potato is not cultivated in Queensland to-day to the extent that its usefulness warrants.

When questioned about the shortage of sweet potatoes for table use, the farmer usually replies, "There is no demand for them." This is true only in part, but the demand still exists for the right varieties. A dry, floury, or a moderately moist potato will suit the consumer best. No doubt, some of the good varieties in use in the past are not now available, owing to droughts and irregular planting, but many are still to be found in certain localities. If the planting is confined to varieties which have proved popular with the consumer, and which could be sold on name, the demand for them should be continuous. Under present conditions a householder may buy sweet potatoes which are unpalatable. If, however, consumers realised that there were different types and varieties of sweet potatoes, they would learn very soon to purchase only types which they like.

Market gardeners might, therefore, cultivate varieties for which they could readily find buyers. Some market gardeners are already doing this with good results. Very watery or stringy varieties are both undesirable. It is a mistake for a grower to allow a portion of his crop to stand over after maturing, as the tubers then begin to deteriorate in quality.

Sweet potatoes are easy to grow and can be raised on a variety of soils, the period of growth from planting to harvesting being approximately three months. The period of planting is dependent very largely on the locality; in most parts along the coast it may extend from October until the end of February. The crop must mature before the frost commences. The crop does not require a big rainfall—in fact, excessive moisture is detrimental to good results, in that it increases the growth of vines, and lessens the crops of tubers.

The most satisfactory method is to plant a few medium-sized tubers in a nursery bed of good friable soil, which is mulched in order to retain moisture and promote rapid growth, and to pick cuttings as growth progresses. A bed of fifty selected tubers planted in this way will provide many thousands of cuttings. The alternative, and less satisfactory, method of obtaining planting material is to procure cuttings from an old plot, which is usually neglected. The terminal cutting from the vine is generally regarded as giving the best results. The land is set up in ridges 3 feet apart. The cuttings should be 12 to 15 inches in length, and planted on the ridge to a depth of approximately 6 inches, cuttings to be set from 20 to 24 inches apart. On well-prepared soil weeds should not be troublesome, and little attention will be necessary until harvesting.

A good crop of sweet potatoes will yield 20 tons of tubers to the acre. Several of the old varieties were known by different names in various districts. A classification of all varieties grown in Australia was carried out in recent years by an officer of the Department of Agriculture and Stock, and cuttings of a known type, together with a number of new seedling varieties, were distributed in different agricultural districts of the State. Some recommended varieties for planting for table use are Gold Coin, Seedling No. 3, Brook's Gem, and Snow Queen.

It is advantageous to the grower to market the tubers in a clean and attractive condition.

AN ANIMAL'S MAINTENANCE RATION.

All livestock rations are divisible into two parts—the part used for maintaining the body in a healthy condition and the part used for production, whether it be for hair, wool, fat, meat, milk, or progeny. Under severe winter or drought conditions, the livestock owner is more concerned with a maintenance standard of feeding, and it becomes important to know where economies may most effectively be introduced.

A short consideration of an animal's reactions to starvation will supply the answer. Take the dairy cow in full lactation: the first defence which nature attempts is a conservation of material and the milk yield falls rapidly. Supplies to the body covering are restricted, and a dull, shaggy, lustreless coat develops. The body reserves of fat are called on and the animal becomes thinner. Horns and hooves become brittle. As starvation advances, some encroachment is made on the last defences—the muscles and vital organs. At this stage the animal weakens rapidly and collapse followed by death results. It is, therefore, clear that the last defences of the body—i.e., the muscles and vital organs—must be protected. For this purpose, the animal must be supplied with protein. In other words, drought feeding should centre round protein-rich foods. Where the stock are close to the source of such foods, the relative merits of each should determine which is to be fed, but on distant properties where freight charges are high it becomes important to buy the most concentrated and most digestible preparations.

Producers often remark that nature gave the sheep a commodious intestinal tract which must be filled, and they usually buy roughage of only moderate protein content. The argument is fallacious when the question is one of maintenance for limited periods only. It is surprising how well sheep can keep their condition on as little as two ounces of cotton seed meal and four ounces of maize daily.

The mineral requirements of stock should be provided for, but the excessive quantity of salt in many licks is unnecessary. Animals are capable of retaining enough salt for normal body functions from a very restricted intake, but lime and phosphate are continuously excreted and must be supplied in greater quantities. More than 30 per cent. of salt in a lick is rarely necessary, and in most cases it could well be less. Lime and phosphate are supplied in a number of forms, but on current prices well prepared sterilized bone meal containing about 20 per cent. protein is, apparently, the best.

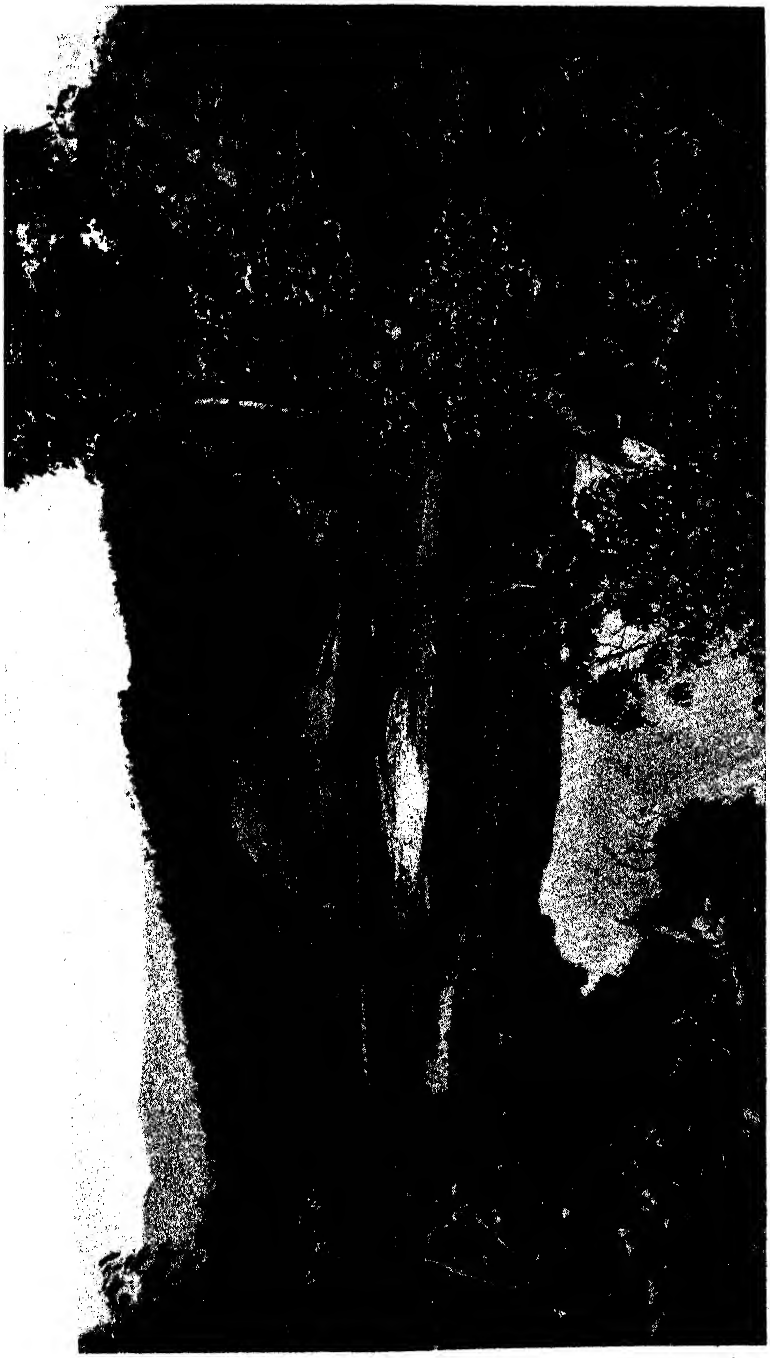


Plate 48.
On the Daintree River, North Queensland.

Plate 49.
THE CONDAMINE RIVER AT LYNDHURST.

Tomatoes in the Central District.

NORMALLY with tomato patches on scrub burns, weeds do not trouble the young crop unduly, but it is advisable to check the weed growth which sometimes becomes serious at picking time. The soil around the base of the plants should be kept loose, at the same time, with the hoe. In cultivated areas the land should be kept well stirred and free of weeds, which both rob the soil of valuable moisture and encourage the breeding of pests such as the corn-ear worm and the tomato mite.

Old plants may be cut back profitably if the root systems are reasonably sound and a bunch of fresh growth is shooting from the main stem; if excessive, this flush of new shoots may be thinned lightly. Severe thinning is undesirable, as it is necessary to retain sufficient foliage to keep a reasonable balance between the root system and the parts of the plant above the surface.

A handful of a 4:11:10 chemical fertilizer, containing sulphate of ammonia, superphosphate, and sulphate of potash should be applied to old plants and backward young plants in order to stimulate new growth and blossoming. When the first fruit has set, a dressing of 50-60 lb. of sulphate of ammonia per acre will help to keep the plants moving.

Tomato mites spread rapidly as the warm weather approaches, and quickly cause a dying-back of the foliage from the centre of the plant. Loss of foliage exposes the stems and the fruit to the hot sun with harmful results. For the control of the mite the plants may be sprayed with lime sulphur at a strength of one in eighty. Alternatively, a dust composed of flowers of sulphur and a good quality hydrated lime in the proportion of 1:1 can be used. If mites already are numerous on the plants, spraying is preferable to the dusting. However, if the plants are treated with a sulphur—lime dust from the seed-bed onwards—a satisfactory control of the mites will be obtained.

Damage by the corn ear worm also increases rapidly in the spring, and may be the cause of heavy losses of fruit if not checked at an early stage. Lead arsenate is the most reliable insecticide for this pest, and may be used as a spray or dust. A suitable spray can be prepared by adding 3 lb. of lead arsenate to 100 gallons of water and including a spreading agent. If mites are troublesome at the same time, colloidal sulphur may be included with the lead arsenate. As a dust, the lead arsenate is used diluted 1:1 with either a good quality hydrated lime or sulphur, the latter diluent having the additional advantage of controlling the mite.

Lead arsenate leaves an objectionable spray residue, and should not be used after the plants have commenced to fruit. Constant attention to the control of the corn ear worm up to this stage, however, gives an excellent chance of a reasonable crop.

Leaf diseases and black spot on the fruit frequently appear as the plants age and lose their vitality. Correct manuring, cultivation, and pest control all help considerably to prolong the life of the plant.

When a fungicide is necessary, either a Bordeaux spray or a copper dust may be used to hold the diseases in check. To control pests and diseases with a combination spray, lead arsenate and a colloidal sulphur preparation may be added to the Bordeaux. Lime sulphur cannot be included in sprays containing either lead arsenate or Bordeaux, as such mixtures are liable to injure the plants.

Various proprietary dust mixtures containing lead arsenate, sulphur, and a copper compound are marketed for the purpose of controlling pests and diseases in one operation.

THE EGG PLANT.

The egg plant is easily grown and produces an excellent culinary vegetable. It is grown similarly to the tomato and, like that plant, is very sensitive to cold. It requires a light, rich, loamy, well-drained soil, and poorer ground may be improved by the addition of a 1-4-1 mixture of sulphate of ammonia, superphosphate, and sulphate of potash at the rate of about 5 cwt. to the acre, or by heavy dressings of well-rotted stable manure to which a small quantity of superphosphate has been added.

For an early crop the seed may be sown under cover during July and August; and, when all danger of frost is over, the plants should be set out about 2 feet apart in rows 3 feet apart. Difficulty may be experienced with transplanting, and it is sometimes desirable to sow the seed in the permanent positions for the plants after all danger of cold weather has passed.

Cultivation and plenty of water are necessary for the plants, as they do not recover readily after a check in growth. The plants may be staked like tomatoes. As soon as the fruits are formed, they should be thinned out to leave only eight or ten to each plant. The fruits are picked when from 4 to 6 inches in diameter. The time from seed planting to transplanting is approximately two months, and from seed planting to mature fruit five months. The best variety is the New York Purple Spineless.

For cooking, the fruit should be cut into slices, salted, and fried in batter. In boiling or baking, the fruit should be seasoned with butter, pepper, and salt.

PARSNIP GROWING.

Although the parsnip is a native of England and must therefore be classed as a temperate climate vegetable, it may be grown with reasonable success in the tropics during the winter season.

Soil for growing this vegetable should be deep, rich, and free. A good sandy loam gives excellent results. The soil should be prepared some months previously by trenching or cultivating deeply, and incorporating a heavy dressing of stable manure. Organic manures should never be applied in considerable quantities immediately before planting this crop, as they frequently induce forking of the roots. At the end of the wet season the ground should be thoroughly worked up and reduced to a very fine tilth. The seed is then sown thinly and very lightly raked over, after which the soil should be rolled or well packed down with the back of a spade along the drills. The packing is necessary to ensure close contact between the seeds and the soil. A light covering of old horse manure well crumbled or old sawdust will assist germination by preventing the caking of the surface soil.

As soon as the seedlings are well up, thin them out where they are over-crowded, and when about 4 to 6 inches high thin out finally to about 8 inches apart.

Parsnip seed is usually of rather poor germinating capacity, and is practically useless unless quite fresh.

RE-WORKING DECIDUOUS TREES.

Too much care cannot be bestowed on the selection of scions to be used for grafting. Just as the grower expects to receive good trees from the nursery, so should he, in proposing to rework trees, take care to see that his scions are the best procurable, for the life of a reworked tree should be, if the job is done properly, just as long or even longer than if it had not been regrafted.

The scions should be obtained for preference when the wood is quite dormant, and since "like begets like," they should be taken from selected trees that are healthy in all respects and, if possible, proved good croppers, or they may be taken from reworked trees, the scions of which had been in their turn carefully selected.

Scion wood can be taken from anywhere in the tree, but it should be but one year old—that is, of the previous season's growth—and with apples and pears free from flower buds. With stone fruit this is not always possible, because, in addition to the simple wood buds, they usually have multiple buds—i.e., both flower and a wood bud at the one location; this does not matter, because the outside flower buds will fall off, leaving the dormant wood bud in the middle.

Medium-sized wood is the best. Overgrown, coarse growth with long internodes should be avoided. Small thin growth also is undesirable.

As the grower usually has plenty of wood to select from he can easily see that he has only the right material. If he has not, then he should get it from a neighbour, rather than attempt to use unsuitable material. The grower should see that he has plenty of scions and he will find it advisable to allow for only one scion out of each wood stick. Assuming the wood sticks are about 18 inches long, the grower will usually find that with the bottom 4 inches the buds are poorly developed. The top 6 inches are too thin and the buds immature, leaving but 8 inches of the most suitable wood in the middle of the stick, out of which it is often hard to cut more than one scion. This applies to scion wood other than the peach or nectarine, which is an exception, because in grafting these fruits it is desirable, if the top portion of the scion is of sufficient thickness, to leave the terminal intact.

In grafting, the principle is to graft a dormant scion on to an active stock and then when the sap flows from the active stock into the dormant scion, it brings the dormant buds of the scion into life and growth commences immediately.

Some growers experience difficulty in keeping their scions dormant, but they will have no trouble if they go about it the right way.

The scions kept should not be merely an armful of prunings of the required variety buried in a trench in an orchard, sometimes without even a stick to mark the site, which often means hunting for hidden treasure when the day for grafting arrives. They should first be tied into neat bundles of from forty to fifty scions to a bundle, labelled correctly as to variety and then buried, so that from a third to a quarter of the scion is in the ground and two-thirds to three-quarters above ground.

Choose for the site a place where they have a reasonable amount of moisture, but as little sun as possible, because it is the warmth of the soil that starts them into life. The south or south-westerly side of a building is a good site.

If the grower experiences difficulty in keeping the scions back because of his having a lot of grafting to do, so that the period has to be prolonged, then he should dig them up one evening, leave them out all night and replace them in the soil in the morning. This will act as a check without harming them in any way.

With scions of stone fruit, should the flower buds commence to swell or even come into blossom, the grower should not jump to the conclusion that they are too forward, because, on examination, it will usually be found that the wood bud which is situated in between the flower buds is still dormant. It is when the wood bud commences to shoot that they are too forward. Should the scions show signs of withering through insufficient moisture they should be buried entirely in a moist place for some days. On no account soak them, because this will cause the buds to absorb a large quantity of water which soon dries out again, and there is grave risk of the buds falling out.

When the time for grafting comes and the scions are dug up it will usually be found that callus formation has started at the bottom—this is a normal provision of nature. Should some of the scions have failed to form this callus, however, they should be discarded, because usually there is something wrong with them.

Some growers are inclined to start grafting too soon. This is inadvisable. It is much harder to perform the operation if the sap in the stock is not running freely. In the Stanthorpe district it will be found that the best time to start is in the last week in August or the first week in September for stone fruits, and for apples and pears a month later. The period can be extended to so long as the scions remain dormant.

With grafting there are three essentials:—(1) Healthy trees; (2) good scions; (3) good workmanship. If any one of these three is lacking, then the result must be a failure.

Officers of the Department of Agriculture are in Stanthorpe to assist growers, and should anyone be in any doubt as to whether his trees are suitable for grafting, he should get in touch with the officer in charge who will advise him as to their suitability or otherwise, and the best grafting methods to adopt according to the circumstances.

Further, should a grower be in any doubt as to his own capabilities as a grafter of trees, then the Departmental officers will be pleased to give him the necessary instruction. It is at times hard to understand how some growers, who have but a very hazy idea of grafting, have so little compunction in cutting down perfectly good trees and, through ignorance, spoiling them for all time when an hour or two's tuition would enable them to do the work correctly and without doubts as to its success.

A pamphlet, "Propagation of Fruit Trees," dealing with this and many other points in orchard practice, is available on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PRUNING DECIDUOUS TREES.

To make a good job of pruning, good, clean, sharp tools are very necessary. Pruners will find it useful to provide themselves with a light box—fitted with a strap to make carrying easy—for holding secateurs, pruning saw, sharp pruning knife, oil-stone, oil-can, pot of coal tar, a brush and a bottle of disinfectant.

A good pair of secateurs is necessary and it must be kept sharp and smooth. Every pruning cut causes a wound, but wounds of small diameter soon callus over provided the secateurs are sharp and clean. Many pruners try to cut with their secateurs some of the larger limbs, and thus strain both the secateurs and their own wrists, while generally hacking the limb off and leaving rough edges which harbour pests and facilitate the entry of fungous diseases. All large cuts should, therefore, be made with a saw which, like the secateurs, should be both sharp and clean.

A sharp pruning knife is necessary for trimming the rough edges left by the saw, for, if they are not pared, callus formation is slow and the wound may not heal.

The need for an oil-stone and oil is obvious. A rub of the secateur blades on the oil-stone now and again keeps them keen and sharp, and makes the work much easier.

Pruners should always have with them a pot of coal tar, for tar is a disinfectant as well as a wood preservative, and being pliable, makes a good surface covering. After pruning one tree and before going on to the next it is advantageous to paint all large cuts over with coal tar. The operation takes only a couple of minutes, and will help the tree considerably.

Both secateurs and saw often require disinfecting, for many diseases can be transferred from tree to tree by these implements. A strong solution of either formalin or corrosive sublimate rubbed over the blade with a rag will reduce any risk.

The foregoing suggestions are valuable, as fruit trees, on which a man depends for his living and which he expects to keep him for many years, deserve the best treatment possible in regard to pruning as well as to cultivation and manuring.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

ALTHOUGH the heat wave of the late summer of 1940 was not repeated, similar conditions in the handling of fruit were experienced. Pineapples and bananas were hard to quit; because of soft rot which occurs occasionally in summer consignments some waste was reported. As mentioned frequently in these notes, Queensland is practically the sole supplier of tropical fruits to Southern markets, and the obligation is on us to give consumers the best value for their money. In this obvious way consumption can be increased. The essentials are quality, careful handling, and attractive presentation. For markets in the South, pineapple-growers should cut their fruit and pack it in good quality woodwool—not bladey grass or coarse woodwool. Banana-growers are advised to continue carefulness in dehanding and breaking fruit from the bunch. All fruit should, of course, be cooled before packing.

Apple and pear growers have a big marketing problem on their hands. "Two apples a day" might supplant the old slogan and, if applied, would go far to solve the pome orchardist's difficulty.

Prices during the last week of February were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Sixes, 5s. to 9s.; Sevens, 8s. to 11s.; Eights and Nines, 10s. to 13s.

Sydney.—Cavendish: Sixes, 6s. to 8s.; Sevens, 8s. to 10s.; Eights and Nines, 10s. to 12s.

Melbourne.—Cavendish: All grades, 7s. to 11s. Bunch, ½d. to 7d. dozen. Lady Fingers, 1d. to 8½d. dozen.

Pineapples.

Brisbane.—Roughs, 4s. to 6s. case. Smoothleaf, 3s. to 6s. case.

Sydney.—Smoothleaf, 4s. to 9s. (Water blister prevalent.)

Melbourne.—Smoothleaf, 7s. to 9s.

Papaws.

Brisbane.—Locals, 6s. bushel.

Sydney.—8s. to 14s. tropical case.

Mangoes.

Brisbane.—4s. to 6s. bushel.

Passion Fruit.

Brisbane.—First Grade, 10s. to 12s. Seconds, 7s. to 9s. half-bushel case.

CITRUS FRUITS.

Oranges.

Brisbane.—New South Wales Valencias, 12s. to 14s. bushel.

Lemons.

Brisbane.—Gayndah, 14s. to 23s. bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Stanthorpe Jonathan, 6s. to 8s.; Delicious, 6s. to 9s.; Granny Smith, 7s. to 9s.; Dunn, 5s. to 8s.

Pears.

Brisbane.—Packham, 6s. to 9s.; others, 6s. to 8s.

Plums.

Brisbane.—Ponds, 5s. to 8s.; Grand Duke, 5s. to 6s.; President, 5s. to 6s.

Peaches.

Brisbane.—Stanthorpe, 2s. to 4s., demand light.

Grapes.

Brisbane.—Stanthorpe: Coleman, 2s. 6d. to 4s.; Waltham, 5s. to 6s.; Muscat, 2s. to 4s.; Choanch, 2s. to 3s., half-bushel case.

Quinces.

Brisbane.—3s. to 5s. bushel.

Figs.

Brisbane.—2s. to 3s. tray; 6s. to 8s. dozen boxes.

TOMATOES.

Brisbane.—Ripe, 1s. 6d. to 3s.; coloured, 2s. to 5s.; green, 2s. to 4s., half bushel.

Sydney.—2s. to 6s., half bushel.

VEGETABLES.

Cabbage.—Brisbane: Stanthorpe, 4s. to 8s. bag; local, 1s. to 5s. dozen.

Beans.—Brisbane: Stanthorpe, 3s. to 5s. bag; inferior, 2s. to 4s.

Peas.—Brisbane: Stanthorpe, 3s. to 5s. bag; New South Wales, 6s. to 10s. per 2 bushels.

Carrots.—Brisbane: 4d. to 1s. 6d. bundle.

Beetroot.—Brisbane: 3d. to 8d. bundle.

Lettuce.—Brisbane: 1s. 6d. to 4s. dozen.

Choko.—Brisbane: 9d. to 1s. dozen.

Marrow.—Brisbane: 1s. to 5s. dozen.

Rhubarb.—Brisbane: 9d. to 1s. 6d. bundle.

Pumpkin.—Brisbane: 3s. to 5s. bag.

Cucumber.—Brisbane: 3d. to 6d. dozen.

THE WALNUT.

Walnut trees grow well in the cooler parts of Queensland where there is a plentiful water supply and deep and well-drained soil. The trees are ornamental and shady, and there is a good demand for the nuts. The trees should be planted in August or September about 30 feet apart. For a few years after planting, all the training necessary is to cut out crossing limbs and to top the most vigorous shoots in order to form a well-balanced tree; subsequently little pruning is necessary. Seedlings may be raised in a nursery bed and planted out when twelve months' old, but as these may take many years to come into bearing and may not bear large crops of good nuts, it is more satisfactory to buy worked trees of tested varieties (Wilson's Wonder, Freshford Gem, and Franquette are recommended). The nuts fall to the ground when ripe, and to prevent losses by rotting should be gathered frequently and properly dried before bagging. Nuts to be used for seed should be gathered as soon as they have fallen from the tree, and soaked in water for a week just before planting. The best time to plant the seed is about the middle of July.

TALL-GROWING VARIETIES OF BANANAS.

The standard commercial banana is the Cavendish, a relatively low-growing form.

Although some of the tall-growing types—such as the Gros Michel, Williams' Hybrid, Vernon, and Mons Marie—have been in cultivation in small areas for a long period, the demand for suckers of these varieties has only recently become of any consequence. In certain favoured localities, they may yet become as popular as the shorter-growing Cavendish.

The fruit of some tall-growing varieties compares favourably with the Cavendish in both size and quality, while their carrying capacity is frequently superior.

Under ordinary conditions, cultural methods applicable to the Cavendish banana can be used for all varieties. They respond to approved desuckering systems used for the Cavendish and, generally speaking, yield a greater weight of fruit per acre. The returns per acre from tall varieties are thus sometimes better than those received from the more widely grown Cavendish.

Veterinary Medicines.

F. B. COLEMAN, Registrar of Veterinary Medicines.

LIST, No. 4, of veterinary medicines registered for the period January, 1939, to December, 1941 (supplementary to List No. 3 published 1st August, 1940). Compiled to 31st December, 1940, in accordance with section 6 (7) of the Acts.

	Reg. No.
A.C.F. & Shirleys Fertilizers Ltd., Brisbane—	
Andrew Dryden's Famous Condition Powders for Horses and Cattle (replaces Andrew Dryden's Famous Worm and Condition Powders for Horses and Cattle)	452
Cramsie Dwyer & Co., Wallangarra—	
G.T.S. Nycatox	2250
L. W. Finney, Brisbane—	
Telson General Purpose Drench	89
Goldsbrough Mort & Co., Ltd., Brisbane—	
Taipo Sheep Drench	2724
D. Maclean Pty. Ltd., Brisbane—	
Judsol	2634
A. H. McDonald & Co., Brisbane—	
Vetamac Tapeworm Drench (replaces Vetamac Tape and Large Bowel Worm Drench)	2829
Osmond & Sons (Aust.) Pty. Ltd., South Brisbane—	
Osmond's "Vermiline" for Poultry (Worm Expeller and Tonic) ..	2741
Eclipsal	430
Osmond's Oxygas	209
Osmond's Vaccadyne	331
Osmond's Restoral	2627
Osmond's Pig Powders	347
Osmond's Cattle Oils	348
Bronkos Cough Paste	478
Osmond's Hooseiline	479
Osmond's Ethodyne	1072
Osmond's Cattle Shampoo	1132
Osmond's Vitaline	1917
Osmond's Compound Santonin Worm Powders for Pigs	1477
Osmond & Sons Life Saving Red Draught	329
Parke Davis & Co., Brisbane—	
Aloetic Physic Ball—Veterinary No. 1	2412
Bio 865 Blackleg Bacterin (Formalinized)	2835
Servo Products, Brisbane—	
Antigerm	2746
S. B. Sharkey, Mackay—	
Bot and Worm Expeller	424
Taylors Elliotts & Australian Drug Pty. Ltd., Brisbane—	
Elliotts Worm and Fluke Drench (Double Strength Carbon Tetrachloride)	2761
Elliotts Enca	2759
Elliotts Neige Copper Sulphate	2763

INDEX OF BRANDS

that are not indicated in the foregoing list by the Primary Dealer's name:—

Brand.	Primary Dealer.
Andrew Dryden's	A.C.F. & Shirley's Fertilizers Ltd.
Bio	Parke Davis and Co.
Elliotts	Taylors Elliotts & Australian Drug Pty. Ltd.
G.T.S.	Cramsie Dwyer & Co.
Telson	L. W. Finney
Vetamac	A. H. McDonald

TO WIN THE WAR—AND THE PEACE.

"The angel of death has been abroad throughout the land; you may almost hear the beating of his wings." That is a familiar quotation. To-day in the homeland the words can be used with greater truth and graphic power than when they were uttered by John Bright in the House of Commons 85 years ago. To-day, over Britain, the Flying Death is a visible and an audible terror, not merely a figure of speech. By day and night he beats his wings with the drone of doom and rains death from the skies. Not a reaper, but a sower of death, more grim and terrible than Father Time, the sound of his coming is the sound of the kill, and human beings are his prey. With agony and blood he is the huntsman of humankind, sowing death in a flick of time. Beneath him, above him, and about him men work and fight to repel him and lay him low. Beneath him, men, women, and children strive to live and endure, asking no more than the right to live in the pursuit of happiness and the right to fashion in their own way the shape of things to come. All of them, gallant people of a gallant nation, hear and face him and strive against him, resolute, unsubdued, chins up and out, doing their best to maintain the integrity and safety of the nation. But, alas, many of them, by day and night, are dying that shattering death which adds horror to the kill. So, to-day, the defenders of Britain are back on the ramparts of their own resolve, seeking to do their best for the nation as a whole, and the altars of their sacrifice burn not with offerings to creed, class, or coterie, but to a cause—the first and whole cause of humanity, the cause of freedom, peace, and Christian principles.

Here in this free dominion of Australia we kinsmen of those who fight and endure at the heart of the Empire need only a realisation of the grimness of the struggle and the vital issues of that conflict to impel us to lend our aid. To us that desperate drama in the Old Land is not a mere wireless entertainment, feeding our emotions from day to day, and from grave to gay, and cultivating an appetite for the next "listen-in." To us, it is a drama of death, of a life and death struggle, of menace and strain, involving our own people, our own blood, our race, our hopes, and our fate as one of the free nations of the world. Borne on the air is the call of kinship, the kinship of race and common cause, the call for the aid and the hand of comradeship, the call for aid from fellow free men and women who are doing and daring, fighting and dying, so that the Commonwealth of Nations, its people, and its principles, shall not perish from the earth. I say that that call will be met. There is no doubt about that. Britain, the lone and valorous, fighting and defending the cause she represents, will not call in vain.

We Australians are not now just children of the Motherland; we are grown to man's estate, taking our responsible part in the scheme of things and our share in national and world affairs. Here, in Australia, the spirit of the Anzacs still lives, and will endure. It will not flag nor falter, because the Anzac spirit is the free spirit of democracy, the spirit of free men and women working for the free institutions they fought to erect and maintain. We are not content with words and phrases. We are not content to leave actions and deeds to the gallant men who take up arms—the successors of the gallant Anzacs of the last Great War. We are out not to win an argument, but to win the war, and to win the peace. . .

—*Mr Thomas Dunstan, M.L.A.* (Gympie)—Report from HANSARD.

Plate 50.

PACK TEAM AT GRANITE CREEK, BLOOMFIELD RIVER DISTRICT, NORTH QUEENSLAND.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Friesian Cattle Society, production charts for which were compiled during the month of January, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	MATURE COW (STANDARD 350 LB.).			
Sunnyside Honey 8th (365 days)	P. Moore, Sunnyside, Wooroolin	16,009·7	577·384	Bruce of Avonel
Rhodesview Biddy 14th (256 days)	W. Gierke and Sons, Rhodesview, Spa Water, Helidon	9,182·9	425·57	Blacklands Prospector
Faversham Diamond	R. J. Couchman, Warra	11,055·18	412·758	General of Croydon
Merravale Melba	W. Soley, Malanda	11,976·5	400·289	Beatty of Greyleigh
Rhodesview Phyllis 2nd	W. Gierke and Sons, Rhodesview, Spa Water, Helidon	10,210·95	399·609	Blacklands Prospector
Sunnyside Flower 12th	P. Moore, Sunnyside, Wooroolin	11,337·55	398·068	Cosey Camp Rupert
Faversham Flossie	R. J. Couchman, Warra	9,636·78	385·677	General of Croydon
Eacham Vale Pretty	W. Soley, Malanda	10,380·4	381·148	Pyree Boy of Pyree
Brundah Holly	C. O'Sullivan, Navillus, Greenmount	9,094·25	355·1	Osiris of Greyleigh
	SENIOR, 4 YEARS (STANDARD 330 LB.).			
Brundah Fancy	C. O'Sullivan, Navillus, Greenmount	10,681·2	416·975	Eros of Greyleigh
Sunnyside Melba 17th	P. Moore, Sunnyside, Wooroolin	9,610·4	333·516	Patrol of Cosey Camp
	JUNIOR, 4 YEARS (STANDARD 310 LB.).			
Sunnyside Empress 58th	P. Moore, Sunnyside, Wooroolin	10,526·4	458·583	Patrol of Cosey Camp
Happy Valley Ailsa	R. R. Radel, Happy Valley, Coalstoun Lakes	6,728·05	312·931	Sunny View Artist
	SENIOR, 3 YEARS (STANDARD 290 LB.).			
Alfa Vale Star 5th (365 days)	W. H. Thompson, Alfa Vale, Nanango	15,493·4	664·475	Reward of Fairfield
Fairvale Ethel 2nd	J. H. Anderson, Southbrook	8,248·08	372·145	Blacklands Red Major
Valera Lila 2nd	R. Ashford, Pittsworth	8,186·98	317·914	Kilbirnie Royalist
	JUNIOR, 3 YEARS (STANDARD 270 LB.).			
Navillus Vision 4th	J. C. Meier, Mount Mort	13,352·7	534·187	Alfa Vale Renell
Patsy 3rd of Brookstead (203 days)	R. Ashford, Pittsworth	7,563·74	320·537	Railway View Loch
	SENIOR, 2 YEARS (STANDARD 250 LB.).			
Valera Lila 3rd	Sullivan Bros., Valera, Pittsworth	7,458·95	310·579	Kilbirnie Royalist
White Park Stella 19th	W. T. Savage, Barnesmore, *via* Toowoomba	6,893·8	272·676	White Park Ronald
White Park Pendant 25th	W. T. Savage, Barnesmore, *via* Toowoomba	6,740·6	271·273	Corunna Viscount

	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
Trevor Hill Jeanette	Geo. Gwynne, Umbiram	9,288·26	368·024	Corunna Supreme
Rhodesview Carnation 12th	W. Gierke and Sons, Rhodesview, Spa Water, Helidon	7,696·25	337·909	Blacklands Prospector
Navillus Plum 4th	C. O'Sullivan, Navillus, Greenmount	7,872·25	299·886	Alfa Vale Renell
Valera Roseleaf 3rd	Sullivan Bros., Valera, Pittsworth	6,535·58	275·058	Kilbirnie Royalist
Blacklands Pretty Jean	T. Ryan, Kital, Allora	6,726·15	253·461	Parkview Limelight
Faversham Poppet 2nd	R. J. Couchman, Warra	6.505·28	252·363	Faversham Rex
	JERSEY.			
	MATURE COW (STANDARD 350 LB.).			
Kathleigh Brown May	F. W. Kath, Moffatt, *via* Dalby	12,276·41	638·62	Retford Royal Atavist
Kathleigh Fantail	F. W. Kath, Moffatt, *via* Dalby	10,915·58	627·983	Retford Royal Atavist
Hope of Peeramon	A. H. O. Koppen, Peeramon	7,626·55	360·788	Trinity Segunda's Prince
	JUNIOR, 4 YEARS (STANDARD 310 LB.).			
Westbrook Sylvia 3rd	Farm Home for Boys, Westbrook	7,096·75	357·786	Westbrook Prince 36th
	SENIOR, 3 YEARS (STANDARD 290 LB.).			
Glenview Twinkle	F. P. Fowler and Son, Glenview, Coalstoun Lakes	7,763·5	348·448	Trinity Governor's Hope
Princess Rose	E. G. Rothery, Archer	6,712·25	322·536	Booser of Cooeeall
	JUNIOR, 3 YEARS (STANDARD 270 LB.).			
Wyalla Crescent	Mrs. M. Allom, Mackenzie street, Toowoomba	7,344·	387·73	Carnation Fairlad
	SENIOR, 2 YEARS (STANDARD 250 LB.).			
Cliefden Beauty's Gem	E. G. Rothery, Archer	6,194·65	286·546	Booser of Cooeeall
	JUNIOR. 2 YEARS (STANDARD 230 LB.).			
Westbrook Sweet Lucy 7th	Farm Home for Boys, Westbrook	5,437·2	328·888	Oxford Aster's Lad
Westbrook Sylvia 5th	Farm Home for Boys, Westbrook	6,074·85	322·377	Oxford Aster's Lad
Westbrook Buttercup	Farm Home for Boys, Westbrook	5,436·5	286·201	Westbrook Ambassador 20th
Strathdean Princess	S. H. Caldwell, Walker's Creek, Bell	5,411·26	259·919	Langside Noble Dreamer
Lermont Rosalie	J. Schull, Lermont, Oakey	5,469·1	258·094	Belgonia Lady's Duke 2nd
	AYRSHIRE.			
	SENIOR, 3 YEARS (STANDARD 290 LB.).			
Benbecula Ladylike	Mr. M. J. Brownlie, Fairhill, Oakey	6,824·6	326·5	Benbecula Tory
	FRIESIAN.			
	JUNIOR, 2 YEARS (STANDARD 230 LB.).			
Tent Hill Stella 11th	W. H. Grams, Upper Tent Hill, Gatton	8,428·7	268·887	Tent Hill Starling's Actuary
Tent Hill Handsome 6th	W. H. Grams, Upper Tent Hill, Gatton	7,649·05	254·613	Tent Hill Starling's Actuary

General Notes

Staff Changes and Appointments.

Mr. G. C. Haim, Ruthven street, Toowoomba, has been appointed an honorary ranger under "*The Native Plants Protection Act of* 1930" and an honorary protector under "*The Fauna Protection Act of* 1937."

Mr. J. W. Wilson, Tregony, Warwick, has been appointed an acting inspector of stock at Maryvale.

Mr. F. G. Retschlag, Spring Creek, Toowoomba, has been appointed an honorary protector of fauna.

Mr. D. Lennon (Enderly road, Ascot) has been appointed an honorary ranger under *The Native Plants Protection Act* and an honorary protector under *The Fauna Protection Act.*

Messrs. E. W. B. Da Costa (Brisbane) and H. M. Groszmann (Nambour), Assistants to Research Officers, Division of Plant Industry (Research), have been appointed Assistant Research Officers, Division of Plant Industry (Research), Department of Agriculture and Stock.

Constable J. Hamilton (Urandangie) has been appointed also an inspector under the Slaughtering Act.

Messrs. W. C. Barlow and C. H. Smith, Clerks of Petty Sessions, who have been transferred to Nanango and Boonah, respectively, have been appointed also acting inspectors of stock.

Cane Prices Board Appointments.

Fairymead Local Board.—Millowners' representatives: Messrs. W. Grimes and J. E. W. Wright (Fairymead Sugar Co. Ltd., Bundaberg); canegrowers' representatives: Messrs. N. E. W. Strathdee (Fairymead) and F. J. Wheeler (Bundaberg); chairman: Mr. R. C. Grenier (Court House, Bundaberg).

Tully Local Board.—Millowners' representatives: Messrs. G. F. Dafforn and E. P. Flegler (care of Tully Co-operative Sugar Milling Association, Ltd., Tully); canegrowers' representatives: Messrs. P. Byrne (Tully) and J. A. Winter (Euramo); chairman: Mr. N. J. Waddell (Court House, Tully).

Erosion Control—The Burdekin River Benefited Area.

Following the enactment of legislation last year to provide for the control of erosion in the Burdekin River area, an Order in Council has been issued under "*The Burdekin River Trust Act of* 1940" creating "The Burdekin River Benefited Area," which comprises Divisions 1, 2, and 3 of the Shire of Ayr as the area to which the provisions of this legislation will apply.

Arrangements are in hand for the constitution of the Burdekin River Trust to discharge the functions and duties imposed under the Act.

Wild Life Preservation.

The property of Mr. V. M. Retschlag, at Spring Creek, Toowoomba, has been declared a sanctuary under "*The Fauna Protection Act of* 1937."

The Waterworks Reserve, Gladstone, has been declared a fauna sanctuary by Order in Council issued under "*The Fauna Protection Act of* 1937."

"Scabby Mouth."

An order in Council issued under *The Diseases in Stock Acts* declares "Scabby Mouth" (infectious labial dermatitis), a disease of sheep, to be a disease under and for the purposes of the abovementioned Acts.

Second-hand Fruit Cases.

A regulation has been issued under "*The Second-hand Fruit Cases Act of* 1940" which provides that every dealer shall furnish to the Second-hand Fruit Cases Committee a supply docket with respect to all second-hand fruit cases sold or otherwise supplied to any grower of fruit and/or vegetables or other permitted person.

Plywood and Veneer Boards.

Orders in Council (2) have been issued under *The Primary Producers' Organisation and Marketing Acts* giving notice of intention to further extend the operations of the Plywood and Veneer Board and the Northern Plywood and Veneer Board, respectively, from the 3rd May, 1942, to the 2nd May, 1947. Producers of plywood and veneer may petition for a poll on the question of further extension, and such petition must be signed by at least 10 per cent. of their number.

Pig Grading for Export.

Pursuant to regulations promulgated by the Department of Commerce, Brisbane, there has recently been an amendment of grading specifications for export pork and bacon pigs, and it is important that pig raisers should remember this when finally preparing their pigs for sale.

Actually, the regulations now limit to 25 per cent. the quantity of porker weight carcases that may be exported in any one consignment, which, in turn, necessitates limitation of the number of porkers that would be received by exporters and bacon curers in Queensland, especially as stocks of porker carcases already in cold store far exceed present requirements and are creating a problem in storage of baconers which are urgently required by the British Ministry of Food.

Actually, it will pay farmers to concentrate on marketing their pigs at baconer weights in prime fleshy condition and conforming to trade requirements as regards type, because under amended price schedules operating from Monday, 13th January, 1941, porker prices have been reduced from 6½d. per lb. dressed weight to 5½d. per lb. for carcases 90 to 100 lb. dressed, and 5¾d. per lb. for those dressing out from 100 to 110 lb., the latter being the maximum weight now allowed for export porkers; these carcases thus vary in value from a minimum of £2 1s. 3d. to a maximum of £2 12s. 8d., whereas baconers weighing 120 lb. dressed are valued at £3 per head and those of 160 lb. dressed weight £4 per head. It should be borne in mind that Commerce Department inspectors have been instructed to strictly reject excessively fat carcases and reduce to second grade those carcases which are considered to be not first grade due to excess of fat.

In calling attention to these amendments, the Minister for Agriculture and Stock (Mr. F. W. Bulcock), stated that the position has been described as serious by a prominent official in the Commerce Department, and it is hoped the issue of this information will lead to an immediate improvement in the position. The British Ministry of Food regards fresh pork as a luxury, but classifies bacon as a necessity.

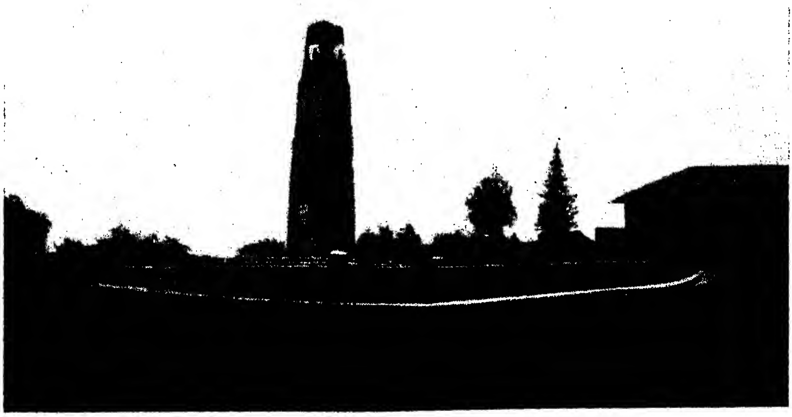


Plate 51.

WAR MEMORIAL, GOOMERI, SOUTH BURNETT, QUEENSLAND.

Answers to Correspondents

VETERINARY ADVICE.

(*Selections from the outgoing mail from the office of the Director of Veterinary Services.*)

Deaths of Cattle—Possible Causes.

S.T.S. (Mackay)—

The cause of mortality in your cattle appears to be one of two things:—

1. The blueish-black colour of the udder in the cow suggests gangrenous mastitis, a form of mastitis in which certain germs which live in the soil get into the udder and cause it to become gangrenous. In such a condition, a considerable quantity of poisons are formed within the udder and these toxins circulating in the cow's blood stream would be enough to cause her death.

The death of the calf could result from sucking the material from the infected udder, although, if the calf was very young, it is possible that starvation may have even been a contributing factor.

The usual symptoms observed with this disease are—

(i.) General dullness and loss of appetite;

(ii.) Usually some lameness, coupled with soreness of the udder and thick, curdled milk;

(iii.) In the later stages, the udder turns bluish-black and becomes cold.

The treatment for this condition consists of regular and frequent strippings of the milk and hot fomentations of the udder.

2. The frothy blood from the nostrils suggests that the mortalities may have been due to hydrocyanic acid (prussic acid) poisoning. This poisoning is caused by the animals eating certain plants which form this poison in their leaves and/or seeds. There are numerous plants which form the poison, notably Johnstone grass, crosses of the "Poison Peach," which is a well known tree in North Queensland. Should hydrocyanic acid poisoning have been the cause of death, it is possible that the calf got some of the poisonous plant at the same time as the cow.

Very few symptoms are seen with this form of poisoning. Usually the cattle show some brief symptoms of bloat, and death is rapid. There is usually a discharge of frothy blood from the nostrils.

The diagnosis of hydrocyanic acid poisoning in the field is made on the history of sudden death, together with the known presence of poisonous plants, as it is necessary that immediate action must be taken to save the beasts. The most modern treatment consists of giving any animal suspected of having been poisoned a drench consisting of photographic hypo, 2 oz.; water, 1 pint. Repeat every thirty minutes if necessary. Treat the symptoms of bloat in the usual way by puncturing the paunch on the left side.

Scour in Calves.

F.D. (Maleny)—

Treatment for this condition should be along the following lines:—

1. Isolate affected calves from healthy ones and use different utensils for feeding.
2. Dose with two to four oz. of castor oil, depending on the age and size of the calf.
3. For a period of twenty-four hours affected calves should be allowed water only.
4. If calves have been on whole milk the first meal of milk following starvation should consist of equal parts whole milk and water, gradually building up to original diet. If on skim milk add one breakfastcupful of lime water to each drink of milk.
5. If scouring persists give one teaspoonful chlorodyne in each drink of milk.
6. If the disease has been present for a considerable time it would be advisable to establish a new calf pen.

Pig Ailments.

G. Mc.I. (Maleny)—

The trouble among your pigs may be due to one of several causes. A heavy ingestion of the large Round Worm of the pig, *Ascaris lumbricoides*, may cause the symptoms, including the later check to growth. The panting condition would be due to the passage of minute, immature worms through the lungs, and so it might occur in a pig even though no adult worms are found in the bowel. More likely, however, the condition is one of contagious pneumonia.

Bad cases may as well be killed straight away, as their subsequent slow rate of growth renders them unprofitable. The remainder of the affected pigs should be isolated from the main herd and given clean, warm, dry sleeping quarters and good, nourishing food. They should be kept isolated until they are disposed of for slaughter, since apparently recovered cases can act as "carriers" and infect fresh animals.

Control of such diseases lies mainly in improved piggery hygiene. Young pigs should not be run with older stock. Farrowing sows should be treated for worms and shifted to a concrete-floored farrowing pen. This should have a creep-opening into a run which has not been used by other pigs, so providing a run for the piglets but not for the sow. These pigs should then be reared in fresh paddocks if possible. Dung should be removed from all pens daily and the pens and yards kept free of litter, rubbish, and damp, muddy spots. Good feeding and good housing are needed to maintain the animals in the best condition to resist diseases in general. The provision of green feed especially is important in the prevention of diseases such as pneumonia.

Care is needed in buying fresh stock—for example, weaners and slips—and these should be isolated for some weeks before joining the main herd. Where it is suspected that a sow is infecting her suckers, she should be fattened and disposed of for slaughter.

Lameness in a Ram.

W.F.B. (Injune)—

The condition cannot be diagnosed accurately without personal examination of the animal, but it is possible that it may be affected with footrot. As some forms of footrot are contagious it would be advisable to keep the animal isolated pending treatment and recovery.

From your description it would appear likely that pus is present in the foot. Under this condition recovery will not take place until the pus is evacuated. This may be done by paring across the toe at an angle of approximately 45 degrees. It may be necessary to remove several thin layers of horn, but do not pare as deeply as the sensitive structure. All irregularities such as cavities, cracks in the horn, and any overgrown horn should be removed. This treatment should be combined with the use of a 10 per cent. solution copper sulphate bath and affected feet allowed to remain in this solution for about one minute—say, three times weekly.

In some cases pus is not present and this condition yields to copper sulphate treatment alone.

Lime Water for Scouring Calves.

R. McB. S. (Baffle Creek)—

The lime you require is ordinary burnt lime, the common form in which lime is sold, and it can usually be purchased at a local store.

Put about 5 lb. to 7 lb. of lime in a cask and fill with water. It does not matter if an excess of lime is added; only a limited amount will go into solution. Stir the lime up for a start to assist the dissolving process, but let it settle—for instance, overnight—and use only the clear liquid. More water can be added from time to time, as long as a thin scum of chalk forms on the surface. If a cask is not available, the lime water can be made up in a bucket, but lime rusts these through rapidly—hence the value of a wooden vessel.

When a calf starts to scour, cut its milk ration down by half and replace by lime water—that is, feed 3 pints each of lime water and milk at each of two feeds. This should stop the scouring inside a day. Then gradually restore the full milk ration, but continue to feed about a cupful of lime water with each feed.

Sterility in Dairy Cows.

W.M.L. (Tannymorel)—

It would appear likely that as the cows calved during dry months they suffered a severe upset of the normal mineral balance, which, to a large extent, controls the sexual cycles. Usually this temporary upset, which prevents the animals coming in season, will disappear with the onset of better seasonal conditions and ample green feed.

Your herd certainly seems to be responding rather slower than normally, but, nevertheless, it is probable that they will gradually return to normal.

This return to normal may be assisted by giving a mineral mixture, consisting of sterilised bone meal two (2) parts, coarse salt one (1) part. Sometimes when ample green feed is available it is rather difficult to persuade cattle to take a lick, and, therefore, it is suggested that a small amount of molasses may be added to the mixture to make it more attractive.

It may also be necessary to vary the preparation of bone meal and salt slightly until you arrive at a mixture which the cattle will take. It may even be advisable to put the bone meal and coarse salt in separate troughs and allow the animals to feed from one to the other. Whatever mixture is used, it should be placed in troughs protected from the weather and the cattle allowed free access.

Footrot in Cattle.

D.S.G. (Edungalba) and H.W. (Dulacca)—

The following treatment of footrot is a convenient one where large numbers of cattle are affected:—

1. Remove any parts of the horn of the hoof which are obviously diseased or which are causing pus to be imprisoned in the claw.

2. Apply the following dressing to the affected parts twice a day:—Creosote, 1 part; linseed oil, 2 parts; turpentine, 2 parts.

The dressing is applied most easily with a brush.

BOTANY.

Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.

"Sensitive Plant."

B.McK. (Kalapa, via Rockhampton)—

The common Sensitive Plant which grows in coastal Queensland is generally regarded as a good fodder, but we think that stockowners are really only making the best of a bad job with it. The plant is there, it is a decided weed, is eaten by stock, but becomes harsh, woody, and prickly, and cannot be classed as a first-class fodder. On the other hand, it is a legume and valuable for soil renovation, especially if dug into the ground. On cane lands it certainly has a place.

Sand Burr—A Possible Pest.

L.M. (Warwick)—

Your specimen represents *Cenchrus pauciflorus*, the Sand Burr, a native of North America. It has become naturalised in New South Wales and Queensland, and during the past season, judging from the number of specimens received, very much on the increase. It has the possibilities of becoming a very bad burr pest.

Acalypha—Kurrajong—Cryptomeria.

E.F.Y. (Coolangatta)—

The specimens of leaves from a shrub represent *Acalypha compacta*, the small, copper-leaved Acalypha, a shrub grown for the ornamental, copper-coloured leaves. It makes an excellent hedge and strikes readily from cuttings.

The tree, in leaf only, we should say, represents the Kurrajong (*Brachychiton populneum*). This tree would grow all right at Coolangatta, but, on the whole, is more suited to inland parts. In coastal areas it is sometimes of rather straggly growth.

Cryptomeria will sometimes grow in coastal Queensland. It does fairly well around Toowoomba.

Plant Specimens Named.

G.A.P. (Drillham)—

1. *Chrysopogon pallidus*, Blue Leaf. A very common grass in Western Queensland and generally regarded as quite a good cattle fodder.
2. *Leptochloa peacockii*, a native grass very common in cleared brigalow country; quite palatable to stock. It contains a prussic acid yielding glucoside but only, so far as our tests show, in small quantities, and we have not heard of trouble from it.
3. *Sporobolus caroli*, Fairy Grass. This grass comes up very quickly following summer rains. While it lasts it provides quite good fodder for sheep.
4. *Eriochloa pseud-acrotricha*, Early Spring Grass. This seems to be the name given generally to this grass, though we do not know that it responds to early spring rains more than some other summer sorts. It is very palatable and nutritious and one of the best of our grasses, but not particularly drought-resistant.
5. *Cyperus retzii*, Downs Nut Grass.
6. *Panicum decompositum*, Barley Grass.
7. *Astrebla lappacea*, Curly Mitchell Grass. This is probably the best of the Mitchell grasses.
8. *Astrebla elymoides*, Hoop Mitchell.
9. *Dactyloctenium radulans*, Button Grass. This is quite a good fodder, either green or in the dried state. When dried down it leaves a lot of leafy material and seed heads both of which are readily eaten by sheep.

Needle Burr.

Inquirer (Gladstone)—

The specimen is Needle Burr (*Amarantus spinosus*), a native of tropical America, but now widely spread as a weed in most tropical and sub-tropical countries. It is very common in North Queensland, and in recent years has spread as far South as the New South Wales border. It becomes something of a pest in places, but is not difficult to eradicate. It is not known to possess any poisonous properties, and seems to be readily eaten by stock. It has been declared noxious throughout the State.

Yellow Pea.

F.A.B. (Hannaford)—

The specimen is the Yellow Pea (*Cassia Sophera* var. *pubescens*). It is sometimes called Arsenic Bush, though this name is not justified. It belongs to the same family of plants as those producing the senna leaves of commerce, and the leaves of your plant, if eaten by stock, have a purgative effect. Sometimes the plants become a pest, and if you have only a few bushes it would be advisable to hoe them out.

Wild Zinnia.

L.H.C. (Chinchilla)—

The specimen is *Zinnia paucifiora*, commonly known as Wild Zinnia, a native of tropical America, but now widely spread as a weed in Queensland. It has become abundant on the Downs and some other places during the last couple of years. It is not known to be poisonous or harmful in any way.

Feather Top.

E.C.D. (Wandoan)—

The specimen is the Feather Top or Feathertop Chloris, *Chloris virgata*. This grass is very widely spread over the tropical and sub-tropical regions of the world. It is an annual grass and a rapid grower. Although a luscious-looking grass it is not usually favoured by stock and they reject it in the presence of other food. They seem to eat it, however, readily enough in the form of hay. It is a very bad weed in some of the lucerne areas of South-eastern Queensland and has seriously decreased the earning capacity of many lucerne fields. The general opinion seems to be that though it will sometimes be eaten by stock its presence is undesirable, since where it grows better grasses, such as ordinary Rhodes grass, will thrive.

Rural Topics

The Hardy Corriedale.

The Corriedale breed of sheep, the sturdy dual-purpose breed evolved in New Zealand and adopted so largely in Australia, has achieved a remarkable distribution among the sheep-raising countries of the world.

In South Africa and South America the breed is increasing in popularity. In the United States great interest is being taken in it, and over there the American Corriedale Association has been formed with a foundation of seventy registered stud Corriedale flocks. One Australian breeder sold recently a foundation flock to a breeder in Cornwall, England. There also are Corriedales in the Falkland Islands, and Japan has bought many thousands of them. A 200-guinea ram has been sold to a breeder in Scotland, and a draft of Corriedale ewes has recently been shipped to the order of the Canadian Government. India has bought a lot of them, and repeat orders are coming from South Africa where the Australian Corriedale does remarkably well.

In Australia, there are now 502 registered Corriedale flocks.

The Problems of Animal Husbandry.

It is now a generally accepted fact that the supply of animal products is one of the most important contributions, from a material point of view, we are making to the Empire war effort. The efficiency of our methods is likely to be tested even more severely by competition in post-war markets.

Detailed plans to investigate the problems of animal production in Australia are now under careful consideration.

Animal husbandry in Australia, it is believed, is already on the verge of big things. In the change which is taking place in our rural industry from soil and pasture exploitation to a more permanent system of maintaining fertility, longer rotations both of crops and pastures will become established in practice. Technical investigations are already being made into the economics of pig raising, fat lamb raising, dairy production, and beef production.

The main idea underlying these investigations is that we should be fully prepared to tackle the problems which must inevitably arise when the calamitous war has ended.

A "Litter" of Lambs.

A Dorset Horn ewe on a Southern sheep breeding station has certainly made a fine contribution to the united war effort by giving birth to quintuplets. All her five lambs are still living and thriving, as also is the mother.

Dorset Horns, it is well known, are noted for their fecundity, twins being more usual than single lambings, and triplets are not uncommon. The rapidity of growth of lambs of this breed of sheep is remarkable; a pound increase in weight a day in stud lambs is not unusual. Crossbred lambs sired by Dorset Horn rams do not develop at this rapid rate, but they do retain to a marked degree this important characteristic of the sire.

Wealth in Land and Livestock.

There was a growing conviction that land and livestock had virtues and values not so severely affected as were many commodities in the present world crisis, said the president (Mr. J. A. Heading) at the last annual meeting of the Australian Illawarra Shorthorn Society, Southern Queensland branch. The fact was bringing new men and wealth and new valuations to farms and livestock. "We must continue," Mr. Heading added, "with a hope and faith and confidence that will outride and outlast all these man-made depressions of spirit that come through war and hate. Breeders will continue adding to the wealth of the world even while there are those who seek to destroy."

Rotational Spelling of Paddocks.

In the opinion of practical men, the chief necessity in natural pasture to-day is for periods of rotational spelling of paddocks, with the object of giving the better grasses, and particularly the better herbage plants which are always sought after by grazing stock, a chance to seed and re-establish themselves. The preservation of our nutritious native grasses is a matter of first importance. On our grasses depend two of our most important industries—woolgrowing and meat production.

Music in the Milking Shed.

A New Zealand farmer tells in *The New Zealand Farmer Weekly* of his experience of music in the milking shed which, he claims, has a soothing and quietening effect on his cows. He has had a radio in his milking shed for the last four years, so is able to speak with some authority. When asked what sort of music the cows liked, he said it was difficult to say as most of the cows take no notice of the music, or no apparent intelligent interest. One cow stood in front of the radio for awhile with her ears back, chewing the cud, but when the "Blue Danube" waltz was being played she stopped chewing, her ears came up, and she seemed to be really interested. The waltz music seemed to be the most effective.

When the radio was first installed in the shed one cow used to walk in and stand in front of the set and wait while the music lasted. Her early enthusiasm has, however, turned to indifference—like listeners the world over!

The workers in the shed enjoy the broadcasts. Summing up, the farmer regards the few pounds spent on the second-hand radio set a definite investment both from the points of view of production and entertainment. The music, however, must be good, otherwise it would send the cows off their milk! So, if his experience is to be accepted as a guide, it would seem that the "Blue Danube" or "The Merry Widow" are the tunes that fill the bucket.

The Value of Sheltering Tree Belts.

Observations over a long period show that crop yields are relatively higher in dry years in areas close to tree belts. In the orchard districts of New South Wales, the destruction of windbreaks by bush fires last year made an appreciable difference to fruit crops.

The withering effects of both summer and winter gales can be minimised largely by the growing of windbreaks and shelter belts in many farming and fruitgrowing areas. Where protective stands of timber no longer exist, the effect of drought on both crops and pastures is usually more severe. Apart from the loss from lower yields, there is the loss of soil by erosion which may be even worse.

One effect of shelter belts, as observed in Southern States, is to diminish considerably the high wind velocity in the drier regions. Another effect is the wider daily variation in temperature.

The effect of shelter belts on the moisture content of the soil in adjacent areas has been investigated, and, while there appears to be little appreciable beneficial effect in the upper layers of soil, there is a marked increase in the deeper layers. Wheat crops in parts of New South Wales which were protected by shelter belts showed a substantially increased yield as compared with open field crops in good years. In seasons of moderate drought the increase was as high as 50 to 60 per cent., and in severe drought years 100 to 150 per cent. Oats showed similar increases. With lucerne, the enhanced yield in favourable years was 20 to 30 per cent., in dry years 100 to 150 per cent., and in seasons of drought 200 to 300 per cent. These are very striking figures, given on the authority of the Director of Soil Conservation in New South Wales. They should help to impress farmers and graziers with the importance and valuable effect of windbreaks, apart altogether from their value in conserving soil.

The practice of timber conservation and the planting of trees in a programme of wise and efficient land use is one deserving of widespread attention.

Luxury in the Dairy.

Queensland dairy farmers will be interested in this: There is a farm in Wisconsin (U.S.A.) on which no human hand touches the cows during milking and the milk is drawn into glass buckets. It is a regular show place with a glass enclosure built especially for visitors, where they may see the seventy-five cows in the yard, watch them, two by two, walk up the gangway to the milking shed, walk through the washing stalls, stop for a clean-up, and go from there into the bails.

An electric milker draws the milk into glass buckets before the eyes of the visitors. They see it weighed and drawn into coolers, untouched by human hands and out of the reach of ordinary bacteria. The milking equipment is sterilised between each cow's milking.

The Turk of To-day—A National Leader's Philosophy.

"I have seen hundreds of factories and industrial exhibitions, from Stalingrad to Stuttgart, and from Detroit to Tatanagar, but I have never been so impressed as I was by what I saw in Ankara. In the place of the Anatolian peasant whom I remember, with his baggy breeches and slow wits, a new kind of Turk has arisen—educated, alert, clever with his hands.

"In 1930 there were 3,000 industrial apprentices. Now (1939) there are 15,000. Turkey is not making the mistake we have made in India, of training up an army of young intellectuals who know about nothing in the world except a smattering of law and literature, and who soon join the ranks of the unemployed. On the contrary, education in Turkey is very carefully adjusted to the technical needs of the country; and vocational experts tour the land, fitting square pegs into square holes.

"The Turks have all the makings of a great people, and they have a sense of humour which an Englishman understands. . . .

"Underneath a picture of Ataturk (the Turkish commander on Gallipoli and post-war reformer), at his model farm at Ankara, driving a tractor in a peaked cap, there is the following quotation from one of his speeches:—

> " 'For 700 years we have neglected the peasant, and left his bones in foreign lands, but this country of ours is worth making a paradise for our descendants; and it can be done only by agriculture and economic activity. The arm which wields the sword may grow tired, but the hands which work the thresher and reaper will grow stronger and stronger.'

"That was Ataturk's philosopy; and it applies to other countries also. He set his people to constructive tasks. Ismet Inonu (his successor) will keep them there."

—*F. Yeates-Brown in his book European Jungle.*

The Language of the Man of Science.

It has been estimated that there is something like a thirty-year lag between the discovery of a new scientific process or practice and its general application on farms and stations, but that time lag now is rapidly shrinking. In these days, as soon as a new discovery is made, or the effectiveness and value of a new treatment or preventive measure has been established, the information is passed on to the farmer and the grazier as quickly as possible. But this new information usually comes to them in the language of the laboratory, and not in the simple terms of ordinary conversation. It is not always advisable to avoid the use of scientific terms, and if we are not mentally lazy we soon get their precise meaning and so the scientific term soon passes into our everyday talk. After all, it is only because the language of the man of science is unfamiliar that it sometimes alarms us. Once we learn its meaning we soon use the scientific word freely. For instance, take paspalum grass, how many of us know that its vernacular name is "Dhoab grass"? But call it by its Latin name, paspalum, and everybody knows what you are talking about. The same with Phalaris tuberosa, or Toowoomba canary grass. Its ponderous Latin name does not frighten us. There is really no need for us to dodge the charge of wishing to air our knowledge or learning if the real intention is to say in as few and accurate words as we can use what we want to say. Take the word vitamin or vItamin—its use saves a lot of roundabout talk. After all, it does not hurt us to learn the language of science; at any rate enough of it so that we can understand immediately what the scientist is telling us for our own benefit, and it is not so very complicated. As a matter of fact, the language of the laboratory is often simpler than our own and often much more precise, brief, and accurate. When he says "subcutaneous" the man of science means just under the skin; not into the skin. When he tells you to inject something into the skin he says "intradermal." He knows what he wants to say, and says just that and nothing else. Here is another example: A description of strangles in a horse—"strangles," says the scientist, "is an acute specific, contagious disease of horses caused by a streptococcus, its chief characteristics being catarrh of the mucus membrane of the pharynx and

suppuration of the surrounding lymph glands." There you have in a single sentence a mass of exact, precise information that could not be conveyed in ordinary language in less than five minutes. So it is worthwhile learning the language of the scientist who is doing so much in helping us to get over our farming difficulties.

Commenting on the foregoing, Mr. H. E. Annett, D.Sc. (Lond.), F.I.C., Grasslands, Matangi, writes in *The New Zealand Farmer Weekly* (30/1/41) under the caption "Too Much Scientific Jargon":—

"A famous classical writer once made the remark, 'The man of science is the only man in the world with something to say to-day and says it very badly.' This brought the retort from a scientist, 'The man of letters has nothing to say and says it at great length.'

"It is interesting to hear the opinion expressed in the article above referred to that the farmer and other laymen should learn the language of the scientist. I have seen this expression of opinion elsewhere.

"However, I am of the opinion that it will be many years before we should be able to interest the average farmer concerning scientific developments if we are to use technical terms. I may be wrong, but I hold the opinion that far too much scientific jargon is used in writing for and talking to farmers. I maintain that if one can find simple words which give a sufficiently clear idea of the position one should use them even if they might not be absolutely accurate. Even in lectures to advanced scientific students I have always used ordinary words in place of scientific terms, which are so frequently not really understood even by the lecturer himself. So long as the lecturer or writer understands his subject, I maintain he should be able to make it intelligible in simple language. Numbers of people take it for granted that expressions they know well are understandable by the laymen. Within the last two years I have seen the following among many other examples of words used in official publications for farmers· 'Manipulation of the gland' was used when 'massage of the udder' would have been understood. 'Potable water' was referred to when 'drinking water' should have been used. Try the expression 'Potable water' on a number of laymen and you will be surprised to find how few understand what is meant.

"This all leads to my main point which attracted my attention in the article. If we are to use scientific language for the farmer, let us make sure it is accurate. The writer makes the following statement: 'Few practical farmers to-day would recognise a certain familiar grass if referred to by its vernacular name of "Dhoab grass." But call it by its Latin name, Paspalum, and everybody without exception will instantly recognise an old identity well known to them.' Personally, I have never heard Paspalum called 'Dhoab.' 'Dhoab,' sometimes written 'Doob,' but more correctly spelt 'Dhub,' is the common Indian name for the grass whose Latin name is Cynodon dactylon. This grass is common in the northern half of the North Island, though of poor feeding value here, but in Northern India, it is looked upon as a very valuable fodder. I know how easy it is to make a slip over names when writing an article, and this is probably the explanation of the mistake."

—From *The New Zealand Farmer Weekly.*

Shock Farming.

One of the latest experiments undertaken by farmers in California is with a machine to produce electric sparks underground as it moves. The object is to increase the fertility of the soil. The contrivance is a tractor-drawn trailer supporting a sort of drag carrying a row of cutting blades. These open the earth 3 or 4 inches down to moist soil. Following each blade closely is an electrode, the end of which is less than an inch above the surface of the uncovered moist soil. A generator on the tractor supplies the current that passes through a transformer, stepped up to 12,000 volts. A distributor arrangement causes a series of sparks to jump from the electrodes to the soil. The inventor believes that it is possible that the electric sparks may do something to the nitrates in the soil, to make them become more readily assimilated by the feeder roots of the plant. His experiments indicate that plants growing on electrically-treated soil show more luxuriant growth than those in untreated adjacent plots.

Expansion of the Pig Industry.

The pig industry is rapidly developing into one of our major industries. In the past the pig industry has been closely associated with the dairy industry, pigs being kept mainly as a convenient means of disposing of milk by-products. Pigs kept under such conditions do not always receive the serious consideration they deserve and are usually badly housed, and also under-nourished because of the unbalanced ration they receive. Opportunities for further expansion of the industry were never brighter than at the present time, and farmers are giving closer attention to the production of more and better pork and bacon.

In the last six months of 1939 exports from Australia aggregated 19,785,516 lb.—90 per cent. more than the quantity shipped in the corresponding period of 1938, with Queensland the largest exporter of pork from Australia, representing about 60 per cent. of shipments.

In a recent article relating to the export bacon industry in Australia, Dr. John Hammond, Director of the Physiological Section of the Animal Nutrition Institute, Cambridge University, contends that if the bacon factories of Great Britain receive from Australia during wartime long, light-shouldered, and not too fat but thick-fleshed carcasses of the right weight (140 to 160 lb.), they will continue to demand them in the post war period.—P. McCallum, Dairy Branch.

The Value of Improved Pastures.

Last year some interesting sheep feeding trials on a property in the Glen Innes district of New South Wales produced some interesting results. Sheep grazed on improved pastures maintained better weight than sheep on natural grasses without supplementary feed. The trials were spread over a period of twenty-one weeks. Of the sheep run on improved pasture, the greatest loss of weight was 8 per cent., while on unimproved pasture the loss was as much as 22 per cent. of their original weight. The local experience is that sheep run solely on natural pasture lose from 20 to 30 per cent. of their body weight in winter, which shows that there is not enough nourishment in the ordinary grasses at that season of the year. A group which had been fed a ration of oil meal cubes kept their weight fairly well, although sheep fed on chaff did not do badly—their final loss being about 10 per cent.

An important point brought out in the trials was that not one of the supplementary feeds compared with improved pasture even if it was not of the best.

Sheep rotationally grazed on natural pastures did better than those run in one paddock of natural grasses, but not much. The season was extremely dry, and under reasonably good seasonal conditions rotational grazing should give better results.

As to the actual financial results: Taking the estimated returns on an acreage basis, it was found that the natural pasture gave an average return of 8s. 3d. an acre, while the improved pasture group gave a gross return of 19s. 2d. an acre. The cost of establishing the improved pasture worked out at just under 25s. an acre, which, of course, would be spread over a number of years. The chaff fed group gave a return of 6s. 3d.

Eucalyptus Oil as Motor Fuel.

One thing a war does is to compel attention to our natural and often neglected assets. Take our gum trees, for instance.

There is at present a brisk demand for Australian eucalytus oil as a source of products used in trades and manufactures. A big percentage of the oil goes overseas. Had Australia established chemical industries back in the nineteenth century a big chain of local chemical works based on gum tree products might be in operation now.

One result of our slackness is that European nations have planted Australian gum trees, and with the oil from these trees compete against Australian oil in the world's markets. To-day, the oils of our peppermint gums are sought by foreign buyers, because of their content of certain chemicals used largely in trades, confectionery, and medicine. Britain and America and Europe were big buyers before the war and, except Europe, still are.

Eucalyptus oil is now suggested as a blend in motor-car fuel. It acts like alcohol--makes for smooth running, and is a decarboniser.

Motorists in the Mallee country of Victoria have found that a compound of leaves of eucalyptus trees is one of the best anti knock compounds in existence for motor vehicles.

A sidelight on the increasing importance of eucalypt products—many farmers are now replanting cleared land with peppermint gums. Peppermint gum plantations may yet become a profitable feature of the Australian rural scene.

GUM TREES

BY

Mrs. E. M. FORGAN SMITH

Although described by the Authoress, Mrs E M Forgan Smith wife of the Hon W Forgan Smith, Premier of Queensland, as "A tree lover's tribute to the beauty and utility to be found in our forests ' "Gum Trees" is filled with valuable information concerning the various species of Eucalypts that flourish in Australia

The book contains a brief description of each species, its distribution, common name, botanical name, and timber It is beautifully illustrated and contains four superb colour plates The cover is a splendid piece of descriptive art

A reproduction (reduced size) of one of the many illustrations is shown on the back hereof

Every lover of nature will delight in browsing through its pages and every Queensland Home should possess a copy

If not obtainable from your local bookseller, copies of "Gum Trees" can be obtained from the Government Printer, Brisbane Price—Stiff cover 5s, limp cover 3s. 6d.

All profits from the sale of this book go to Queensland Patriotic Funds.

GUM TOPPED BOX

(E hemiphloia)

Left Branchlet with flower buds

Right Leaf

The Value of "Live Wire" Fences.

In the Old Country, with so much new land ploughed up, the demand for fencing has greatly increased, and is being met by the use of "live wire" electric fences. Over there, they are finding that the electrified fence needs only a single strand of wire on light fencing posts 12 to 15 yards apart. On some farms, light angle iron posts are in use, and they have the additional advantage of being easily removed. A six volt motor car type of battery and electric current controller send an intermittent current through the wire at 30 to 60 times a minute, and this gives an animal touching it a shock that causes neither pain nor harm, but enough of a "kick" to make it keep away from the wire in future.

There is little doubt as to the efficacy of this fencing system, and recent official inquiry in Britain has confirmed its advantages, particularly for penning pigs. The important thing is to see that the height of the wire above the ground makes contact with the animal certain.

The electric fence is ordinarily quite harmless to stock or to human beings, but there have been some sad experiences in America when attempts have been made to link it up with a main electric supply. Hardly less disastrous have been the efforts of some thrify-minded people to "knock together" their own control equipment. It is all a matter of commonsense, for to fool about with highly charged live wires is like asking for a one day pass to the cemetery.

It certainly looks as if the electric fence has come to stay as an essential in farm equipment, and a way out of many fencing troubles.

Fodder Conservation Pays.

Last year's drought in the country below the Border which, fortunately, was partly broken by recent rains, had its compensations to some extent in that it led to an intenser study of fodder storage possibilities. For one thing, it showed that those landholders who stored surplus pasturage before the dry spell set in had a lot to be thankful for. Baled hay seemed to be the general preference, because of the ease with which small bales can be handled both in stacking and feeding. In the Moree district, some graziers had baled up surplus herbage growth which turned out to be excellent hay; in fact, the clover burr, or burr trefoil, hay was regarded as superior even to lucerne hay, mainly because of the large amount of seed it contained. On one property, 700 tons of silage was made last year from crowfoot, trefoil, and barley grass. So satisfactory were the results that it is planned to clear areas all over the holding for the purpose of harvesting in future good seasons similar material for silage, and Mitchell grass for hay. With silage, the cost was estimated at 8s. a ton for cutting the growth and filling it into the pits. Horses were used to do the work.

The Apiary

HINTS ON MAKING HIVES.

IN South-eastern Queensland some beekeepers, both commercial and non-commercial, already make their own hives and frames, and it is possible that others will think of making their own equipment in future.

When constructing a hive, the first essential is for the beekeeper to decide upon the size and type; the Standard Langstroth ten-frame hive is recommended. By having uniform equipment the parts are interchangeable from hive to hive and manipulation of the colony is therefore comparatively easy. An apiary comprising standard equipment will always sell at a better price than an apiary made up of an assortment of material or of material of unusual sizes.

In constructing a hive, the timber used should be seasoned, good-quality soft-wood, so that the completed article may be solidly built and able to withstand rough usage. Cement-coated nails should be used, as they do not slip, with the result that warping and distortion is prevented. The corners of the hive can either be rabbeted or butt-jointed; whichever method is adopted, a plentiful supply of nails should be used, as the corners are the weak parts of the hive. If the corners are butt-jointed, the timber must be well squared, so that the hive body will show no cracks after nailing. Unless these corners meet evenly, the completed hive will usually be out of shape and will not fit the other equipment satisfactorily.

Before nailing, the joining surfaces should first receive a good coat of paint. After the hive body has been completed, it is given two or three coats of paint externally, the sawn edges receiving particular attention. The paint has the effect of weather-proofing the hive, which, if repainted about every three years, will last indefinitely, as there is then little chance of the timber warping. The cover, of course, should be well painted for preservation in the case of a wooden cover and as a means of reducing the hive temperature in the case of a cover sheeted with galvanised iron; white or very light-coloured paint should be used.

When making the frames, the important factor of bee-space should be considered. The spaces between combs and between the outer comb and the walls in a natural hive usually approximate to ¼ inch in width. In the modern hive the sizes of the parts should be so arranged that the frames are likewise separated from each other, from the walls, and from the top and the bottom by "bee-spaces" approximating ¼ inch. Failure to do this will result in the bees plugging any narrower spaces with propolis or building wax comb in any wider spaces. Either of these activities makes the frames difficult to remove and interferes to some extent with hive manipulation. The length of the lugs of the frames in relation to the width of the horizontal rabbet in the top of the end boards of the hive will determine the end spacing of the frames; similarly, the thickness of the lugs in relation to the depth of the rabbet will determine the top spacing.

In badly constructed hives the young larvæ of the wax moth can usually be found where the frames touch the walls or where the cover fits closely to the top bars of the frames. If, however, bee space is allowed in the hive, the bees have access to every part and can prevent wax-moth infestation. Similarly small ants frequently nest on the top bars of the frames where bee-space has not been provided. In addition, correct bee-space enables the bees to ventilate the hive properly.

NOTICE TO READERS.

Because of the present necessity for strict economy in the use of paper, readers are requested to renew their subscriptions promptly. If renewals are unduly delayed, it may be impossible to supply back numbers of the Journal.

Address all renewals and other correspondence to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Farm Notes

APRIL.

SUMMER-FALLOWED wheat lands should now be in good condition, and may be maintained in good tilth by a light surface working after every rainfall of over half an inch.

Seed wheat may be prepared and held in readiness for immediate sowing by grading and treating with an approved bunticidal dust for the prevention of smut. Copper carbonate, or the mercury dusts agrosan and ceresan, will be found effective for this purpose, using from 1 to 2 oz. to a bushel, according to the efficiency of the mixing apparatus employed.

Seed barley and oats should be treated with a mercury dust, or with formalin in preference to copper carbonate.

The main sowings of winter cereals and legumes required for winter and spring feed may be made during this month; and growers are advised to include field peas or tares at the rate of 20 lb. seed per acre, thereby increasing the nutritive value of the fodder obtained. Algerian oats predominate in present sowings, but the barleys—Cape and Skinless—in addition to the slower maturing varieties of wheat are also of value.

April and May are good months for the sowing of lucerne. The area under this valuable crop should be extended whenever and wherever possible. By sowing when weed growth is at a minimum, the young plants have a better chance to become strongly established, and there is less likelihood of the surface soil drying out and affecting germination, than if early summer sowings are made. From 10 to 12 lb. of seed to the acre is ample on the best lucerne lands, but where sown largely for grazing purposes in the drier districts 3 to 4 lb. to the acre should be sufficient.

Root crops sown during March will be making fair growth, and should be thinned out to permit of full development. Further sowings of mangolds, swede turnips, sugar beet, field carrots, kohl rabi, and rape may be made where soil moisture is sufficient.

Information on fumigation of maize may be obtained from the Department of Agriculture and Stock, Brisbane.

Sorghums and other summer fodder crops which are approaching maturity, and are not required for green fodder, should be conserved as silage wherever possible.

Pumpkins required for storage should be allowed to ripen in the field, gathering with the short stalk attached and storing in a dry airy shed, preferably on slatted shelves to permit of rapid inspection for possible decay.

Winter grasses and clovers may be sown during April in districts suitable for their growth, but sowings must be made on thoroughly prepared cultivation.

Orchard Notes

APRIL.

ONLY the best fruit should be selected for market, and it should be graded for size, colour, and quality, and properly packed—only one grade of fruit being packed in a case.

All orchards, vineyards, and plantations not thoroughly clean should receive early attention, for from now until the next rainy season the ground should be kept in a thorough state of tilth and free from harmful weeds in order, firstly, to retain moisture in the soil; and, secondly, to enable birds, ants, and predacious insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations should be put into good order, and kept free from noxious weed growth.

Land to be planted with fruit trees should be prepared now. It is always advisable to allow newly cleared land time to sweeten before planting.

QUEENSLAND SHOW DATES FOR 1941.

March.

Allora Sports Day 8th
Pittsworth .... 11th and 12th
Millmerran 14th
Goombungee 15th
Toowoomba Royal .... 24th to 27th

April.

Dalby .... 1st and 2nd
Tara .... 4th and 5th
Chinchilla .... 8th and 9th
Miles 16th
Taroom Campdraft Show 28th, 29th, and 30th
Kingaroy .... 30th April, and 1st and 2nd. May

May.

Monto .... 1st to 3rd
Goondiwindi .... 2nd and 3rd
Longreach .... 5th to 7th
Nanango .... 8th and 9th
Mundubbera .... 7th and 8th
Blackall .... 12th and 13th
Roma .... 14th and 15th
Gayndah .... 14th and 15th
Murgon .... 15th to 17th
Beaudesert Show .... 14th and 15th
Beaudesert Campdraft .... 16th and 17th
Warrill View 17th
Mitchell .... 21st and 22nd
Biggenden .... 22nd and 23rd
Blackbutt .... 23rd and 24th
Charleville .... 27th to 29th
Ipswich .... 27th to 30th
Gympie .... 29th to 31st
Kalbar 31st

June.

Maryborough .... 5th to 7th
Lowood .... 6th and 7th
Childers Patriotic Carnival 9th and 10th
Boonah .... 11th and 12th
Bundaberg .... 12th to 14th
Gin Gin Horse Show and Carnival 16th and 17th
Gladstone .... 18th and 19th
Rockhampton .... 24th to 28th
Toogoolawah .... 27th and 28th

July.

Mackay .... 1st to 3rd
Proserpine .... 4th and 5th
Bowen .... 9th and 10th
Charters Towers .... 10th to 12th
Ayr .... 11th and 12th
Nambour .... 10th to 12th
Townsville .... 15th to 17th
Laidley .... 16th and 17th
Rosewood .... 18th and 19th
Ingham .... 18th and 19th
Cleveland .... 18th and 19th
Gatton .... 23rd and 24th
Cairns .... 22nd to 24th
Innisfail .... 25th and 26th
Atherton .... 29th and 30th
Crow's Nest .... 30th and 31st

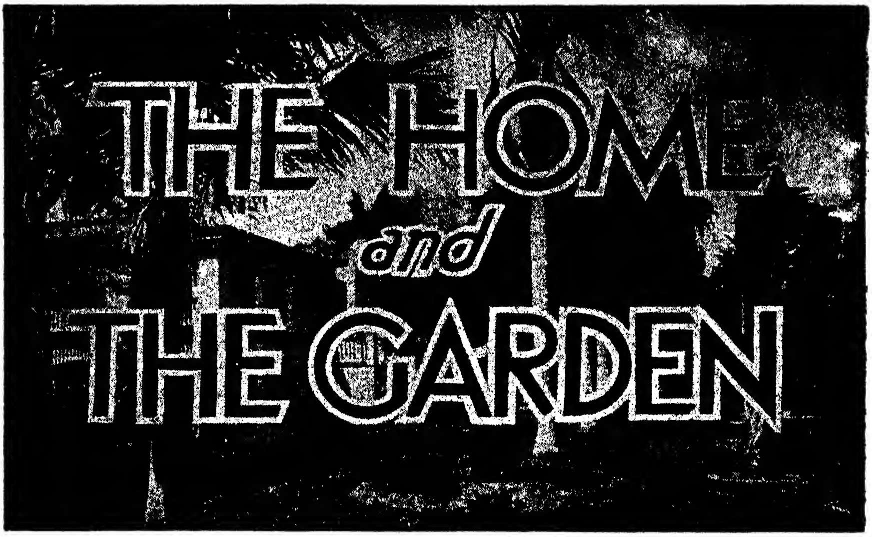
August.

Pine Rivers .... 1st and 2nd
Home Hill .... 1st and 2nd
Royal National, Brisbane 11th to 16th

September.

Imbil .... 5th and 6th
Canungra 6th
Pomona .... 12th and 13th
Rocklea 13th
Beenleigh .... 19th and 20th

Plate 52.
Weary Bay, at Mouth of Bloomfield River, North Queensland.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

CARE OF MOTHER AND CHILD.

THE HANDICAPPED INFANT.

OF the many babies who are born into the world there are a few who are handicapped from the first. Although they may appear to have no physical defect they behave differently from other babies. Some of them cry continually without any obvious reason, others take faint turns. Many of these children take a long time in learning to do or to notice things, and such little things that they do are done in an unusual manner. They are often slow in learning to sit up, to walk, and to talk. It is to the mothers of such children that we wish to speak this month.

Baby's Progress.

Lest any mother be needlessly anxious about the progress of her baby, we want her to know that children differ in regard to the ages at which they reach the various stages of development. At the age of three months most babies are able to hold up their heads. At about the sixth month they are learning to sit up, although they may be eight or nine months old before they can sit without some support, particularly if they are big, fat babies. By about the ninth or tenth month most babies can crawl, and by the eleventh month they are able to stand with support. Between twelve and fifteen months they learn to walk alone. If there is excessive delay in reaching any stage—for instance, if baby is unable to sit up by the time he is nine or ten months old—medical advice should be sought.

In regard both to cutting teeth and talking there is considerable variation in the rate of development. The first tooth may be cut at the age of six or seven months and six teeth may be present at twelve months. The cutting of the first tooth may be delayed until the age of nine months and quickly followed by the cutting of others. On the other hand, the first tooth may be cut at six months and then two or three months pass before the next tooth appears, although baby is perfectly healthy.

A baby may utter single syllables at the age of nine months and single words at twelve months. A few are slow in learning to speak, although they hear and understand what is said to them. As they mix with other children they learn to speak.

Delayed Development.

When a baby is not quite like other babies of his age in his behaviour it is important that his mother should recognise it early. She can then set herself to learn how she can best help her baby to grow like other babies.

It is often impossible to find out the reason why these babies are different, but it is certain that only in a few instances is it in any way the fault of their parents or anyone else. We need not concern ourselves at present with puzzling questions as to how and why these things happen. What does interest the mother is what can be done to bring the child on in every way possible. There are two reasons why baby may have difficulty in using his limbs like other babies. In the first place, he may lack the natural curiosity in his surroundings, which promotes spontaneous activity, and, in the second place, his muscles may be soft and weak from want of use.

What the Mother Can Do.

The mother must realise that a great deal more time and patience will need to be spent on her baby's training than in the case of other babies. His progress will necessarily be slow. Some time may require to be spent in teaching him things which other babies seem to learn for themselves. She should not worry more than she can help about baby's future. No one can tell how much he will improve—only time will show. Her work is to persevere with her training. Many mothers with not a great deal of spare time and very little experience have succeeded very well in training children like these. Although the difficulties are great to begin with they will become less with practice. The mother must not expect too much of baby. She should not allow failures to disappoint or discourage her but go on trying each day to do a little, avoiding fatigue. She should find out the things that baby is able to do with least difficulty and train him to do them better. He must be encouraged and helped in doing things that are a little difficult, but not allowed to go on trying to do something which is too difficult at his present stage of development. Frequent failure will discourage and irritate him. Mother must always be ready to praise him for any little success he has.

It will be necessary to arouse his interest in his surroundings through his senses. He may be shown bright, moving objects, he may be allowed to handle and grasp objects, and to listen to various sounds. By these means he will be taught how to use his weak limbs and so strengthen them.

The services of a trained nursery school and kindergarten teacher who is temperamentally suitable will be found of great assistance.

Stiffness of Limbs.

In some cases the difficulty in moving the limbs arises from their stiffness. The muscles themselves may be quite strong, but the child is unable to control them. The general stiffness prevents him from moving his head to look about him, from sitting up, and from standing and walking. It often makes swallowing difficult, causes dribbling of the saliva, and interferes with speech. The baby who suffers in this way is severely handicapped, but is capable of making steady progress under suitable training and treatment.

You may obtain information on all matters concerning infant and child welfare by visiting the nearest Maternal and Child Welfare Centre (Baby Clinic), or by writing to the Sister in Charge, or by communicating direct with the Maternal and Child Welfare Centre, Alfred street, Fortitude Valley, N. 1, Brisbane.

MILK IN THE HOME.

The keeping quality or "life" of milk is dependent primarily on the care exercised in its production and handling on the farm. The neglect on the part of the householder to observe certain precautions, however, may seriously impair its keeping quality, consequently the milkman is blamed for what should really be the responsibility of the customer.

Every utensil into which milk is put adds its quota of germ life to the milk. It cannot, therefore, be expected that milk, even if produced under careful conditions and thus having a low bacterial count, will keep well if it is subsequently

treated carelessly in the consumer's home. The consumer must accept his share in ensuring that this most valuable food is kept as pure as possible. In the home, the prevention of the introduction and growth of germs in milk depends chiefly on the cleanliness of the jugs or other vessels in which it is contained and the temperature at which it is held.

The cleaning of any vessel which is intended for milk requires a slight modification of the usual procedure in washing dishes and pots and other household articles. The following instructions should be observed:—

1. Rinse with cold water.
2. Wash in hot water or hot water to which washing soda has been added.
3. Scald with boiling water.
4. Invert to dry. Cloths should never be used for drying as they simply reintroduce numerous germs which, if favourable conditions exist, will multiply extensively in and reduce greatly the period of sweetness of milk placed in the vessel afterwards.

Any milk vessel cleaned in the way described will add very few additional bacteria to those already present in the milk on its delivery, whereas a neglected or carelessly washed container might add countless numbers. The influence of an improperly cleaned vessel in reducing the "life" of milk will be appreciated readily if it is remembered that bacteria double in number every twenty to thirty minutes at ordinary temperatures. Their multiplication is markedly restrained at lower temperatures until below 50 deg. Fahr., when it is practically suspended. The object in keeping milk as cool as possible in the home is, therefore, evident.

To preserve the freshness of milk in the home, the chief things to be done are—

1. Use only vessels free from cracks and chips and cleansed scrupulously in the way already described. Plain vessels are preferable to those of fancy design, because of the greater ease in cleaning them.
2. Keep the milk in a cool clean place.
3. Always cover the milk jug to exclude insects, particularly flies, as they, especially, transport numerous objectionable bacteria.
4. Since milk fat readily absorbs odours from its surroundings, milk should be kept apart from any substance possessing a penetrating odour—onions, certain fruits, such as pineapple, meats, and fish in any form.
5. Remove the jug from the doorstep, or wherever it is placed, as soon as possible. See that the milk is protected from the sun, preferably in a cool, dark place.

IN THE FARM KITCHEN.

ORANGES, LEMONS, AND GRAPEFRUIT.

Because of their vitamin content, citrus fruits deserve a prominent place on the menu several times a week. This is, of course, apart from the daily morning drink of orange or lemon juice.

The recipes below describe several health-giving and appetising desserts made from oranges, lemons, and grapefruit, which are suitable for serving all the year round.

Orange Fruit Souffles.

Take 1½ oz. flour, 1½ oz. sugar (or to taste), 1½ oz. butter, 3 eggs, oranges as required.

Cut a circular slice off the top of each orange, scoop out the pulp, but do not break the skins. Rub sufficient pulp through a sieve to give half a pint. Melt the butter in a stewpan. Add the flour, and when blended stir in the orange pulp and boil it until it is thick. Remove it from the heat and cool it. Add the sugar and the three egg-yolks, one at a time. Whisk the egg-whites very stiffly and fold it lightly into the mixture. Fill the orange cases with the preparation and set them on a baking sheet in a moderate oven for 20 minutes. Serve them quickly. Any left-over mixture may be baked in a buttered souffle dish.

Creme Renversee a l'Orange.

Take 2 oz. castor sugar, 2 large oranges, 4 eggs, ½ pint milk, ½ oz. gelatine, whipped cream, a little water.

Sieve the castor sugar on to a plate and grate the rind of the oranges on to it. Rub these ingredients well together with the fingers, and then put the orange-flavoured sugar into a basin. Add to it the yolks of 4 eggs and the whites of 2, and beat together for a few minutes. Heat the milk and stir it gradually into the basin. Return all to the saucepan and stir gently over the heat until the custard thickens, but do not allow it to boil. Remove quickly from the heat and strain into basin. Dissolve the gelatine in very little water and strain into custard, also the juice of the oranges. Stir occasionally until lukewarm, then pour into a wetted mould, and put in a cool place to set. Turn out on to a glass dish and serve with whipped cream.

Orange Bavarios.

Take 1 cupful orange juice and pulp, ¼ cupful cold water, 1 tablespoonful lemon juice, 1 tablespoonful gelatine, ½ cupful sugar, 1 cupful cream, pinch salt.

Soak the gelatine in cold water for 5 minutes, and dissolve by standing cup containing mixture in hot water. When dissolved, add to orange juice and pulp. Add lemon juice, sugar, and a pinch of salt. Allow to cool, then fold in whipped cream. Turn into a mould rinsed out with cold water.

Orange Charlotte Russe.

Take 6 oz. lady-finger biscuits, ½ packet lemon jelly, 1 orange.

For the filling:

Take 2 oranges, 1 oz. gelatine, 2 eggs, ¾ pint milk, 2 oz. sugar, 1 gill cream.

Peel one orange, divide it into sections, and remove the pith. Dissolve the jelly in half a pint of hot water. Rinse a cake-tin in cold water and pour in enough jelly to cover the bottom. Let it set and lay on it a circle of orange sections with three in the middle. Pour on a few spoonfuls of jelly to keep the orange in place and let it set, then pour on the remainder of the jelly. Cut the sides of the biscuits straight and make them all the same length. When the jelly is firm, arrange the biscuits standing in it all round the tin. To make the filling, grate the rind of 1 orange and put it in a double saucepan with the eggs and sugar. Whisk with an eggwhisk and add the milk. Stir the custard till it is thick enough to coat the back of the spoon. Let the custard stand where it will keep warm. Squeeze the juice from the oranges on to the gelatine and add half a gill of cold water. Dissolve the gelatine slowly over a low gas, stirring all the time, and when cool stir into the custard. Whip the cream and add it to the mixture when quite cold. Stir as it cools, and when it thickens (but not before) pour it into the prepared tin. When set, dip for a moment into hot water to loosen the jelly from the tin. Place a dish on top, turn upside down, and shake very gently.

Lemon Cream.

Take 3 lemons (rind of two, juice of three), 6 oz. castor sugar, 1½ dessert-spoonfuls custard powder, 1 oz. butter, ½ gill cream, crystallised lemon slices and glace cherry for decoration, ½ oz. gelatine, water.

Wipe the lemons and grate the rinds finely. Squeeze out the juice and strain it, then make up to three-quarters of a pint with water. Mix the custard powder to a smooth paste with some of it. Put the remainder into a saucepan with the grated rind, sugar, and butter, and when boiling stir on to a custard mixture, then leave until cold, stirring occasionally. Whisk the cream until it stiffens and stir in. Dissolve the gelatine in a saucepan with half a gill of water (extra to that given in recipe) and strain it, mixing all together lightly. Turn into a wet mould or basin, and when set turn out and decorate with crystallised lemon slices. If these are not available, use slices of fresh lemon.

Lemon Rice.

Take 8 oz. rice, 8 oz. sugar, 2 lemons, water.

Boil the rice and drain it. Pour cold water over it until the water is clear. Boil barely 1 gill of water with the sugar, lemon juice, and grated rind of the lemons until this syrup is quite thick (letting the sugar dissolve before it comes to the boil). Mix this with the rice. Simmer them in a double boiler for an hour. Remove it from the heat and let the rice cool. Then turn it on to a glass dish and garnish it with lemon and plainly boiled rice, and serve with stewed fruit.

Baked Lemon Pudding.

Take 1 lemon, 2 eggs, 1 breakfastcupful sugar, 2 small tablespoonfuls arrowroot, 1 dessertspoonful butter.

Mix the arrowroot smoothly with a little cold water. Add the egg-yolks, not beaten, half the sugar, the strained juice of the lemon, and the grated rind. Add 1 pint of boiling water, and boil for 5 minutes. Mix the butter well with the ingredients, then put the mixture into a buttered dish. Beat the egg-whites to a stiff froth, and add the remainder of the sugar to them. Spread this on top of the pudding and bake in a moderate oven until it is a light-brown.

Grapefruit Mousse.

Take 2 grapefruit, 1 egg, ½ gill milk, ½ oz. gelatine, ½ gill water, 5 dessertspoonfuls castor sugar.

Cut the grapefruit into halves crosswise, then remove the pulp and rub it through a sieve. The best way to loosen the pulp is first to remove the centre pith and pips, then cut round the side of the pulp to loosen it from the rind, and again through each section. Separate the egg. Beat up the yolk and mix with the milk, and cook in a double boiler until it thickens. When cold add to the grapefruit pulp with the sugar. Dissolve the gelatine in a saucepan with the water and strain it in. Mix together, then leave until beginning to set. Then fold in the well-beaten egg-white. Turn into the grapefruit rinds. Allow half a grapefruit for each person.

Grapefruit Sponge.

Take 1½ cupfuls grapefruit pulp, 1 egg-white, ½ cupful boiling water, ½ cupful castor sugar, 1½ tablespoonfuls gelatine, 4 tablespoonfuls cold water, 1 cupful grapefruit juice, 2 tablespoonfuls grenadine syrup, whipped cream.

Dissolve the gelatine in boiling water. Stir in the grapefruit juice, sugar, and syrup. Stand till the mixture begins to thicken, then beat till foamy, then add the pulp and 2 tablespoonfuls well-drained grated pineapple, if liked. Fold in the stiffly-beaten egg-white. Turn into a wet mould and leave till set. Serve turned out, and decorated with whipped cream.

IN THE FARM GARDEN.

GARDEN SEED SELECTION.

In selecting and saving seed for future plantings, the most vigorous, healthiest, and heaviest-bearing plants should always be reserved for the purpose. Type and production are essentials that should always be observed.

Various methods are used in the harvesting and cleaning of garden seeds, but the actual principles remain more or less steadfast. Seeds should not be harvested until fully ripe or mature. It is equally important that the crop should be promptly gathered when the proper time has arrived. If seed be left too long on the plant, sprouting or moulding may occur, and the seed, at least, will discolour. Seeds are generally ripe when the pods or seed capsules turn yellow, or the fruits—such as tomatoes and melons—lose their firmness.

Bright sunny weather should be selected, if possible, for the harvesting of crops which require threshing—such as beans and peas. The plants should be dried thoroughly before threshing, and it is always better to select days of low humidity for this operation. No matter how the seed is threshed, the greatest care should be taken to prevent breaking the seeds or the seed coats. Winnowing is often necessary for the final cleaning of the seed.

In obtaining clean seeds of such fruits as tomatoes and melons, the ripe fruits must stand for some time in their juices to remove the mucilaginous covering. A common method is to throw the cut specimens or the scooped-out pulp into any convenient vessel—such as a bucket, tin, or small barrel—and stir daily until fermentation has loosened the covering about each seed. This requires from three to six days. To prevent the discolouring of seeds, the fermentative process should not be continued longer than necessary.

After fermentation, the seeds are separated from the pulp and the skin by washing as often as may be required to obtain clean seeds. The good seeds settle to the bottom of the vessel, while the pulp, skin, and light seeds rise to the top and may be poured off. Three or four washings are usually sufficient, and the use of sieves in this process of separation is recommended.

After winnowing or washing, as the case may be, all seeds must be cured thoroughly before storing. They should be spread in layers on trays in well-ventilated places until completely cured. It is an advantage to wash early in the mornings of bright days to facilitate drying, which should always be done under shade. Seeds may be stored in either cloth or paper bags. The greatest enemy to the preservation of seeds is moisture, but usually the conditions in an ordinary living-room are satisfactory. Provided the seeds are well cured and the humidity remains low, ordinary fluctuations in temperature do not affect the vitality of the seed. It is a well-known fact that seeds do not keep well in North Queensland, because of the great amount of moisture in the atmosphere. Some seeds—such as cabbage, turnip, and radish—stand a very great chance of becoming mouldy unless kept in well-ventilated containers.

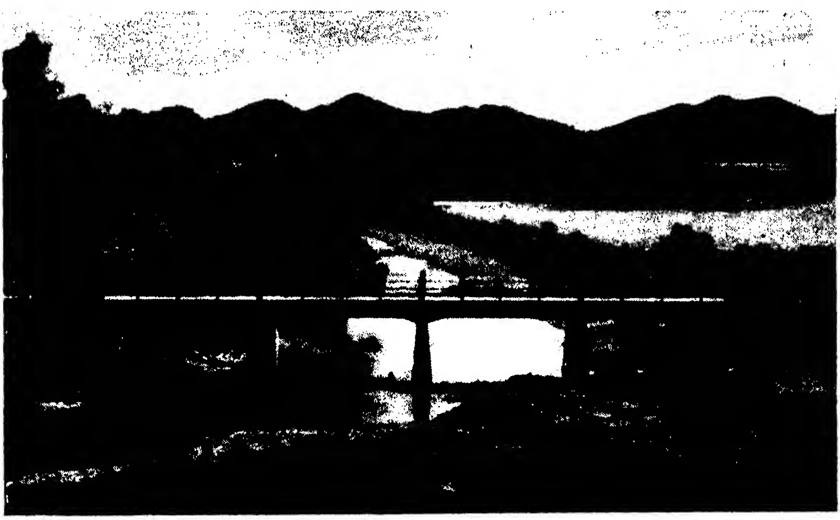


Plate 53.
MENA CREEK, NEAR INNISFAIL, NORTH QUEENSLAND.

ASTRONOMICAL DATA FOR QUEENSLAND

APRIL, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON.

AT WARWICK.

April.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
	a.m.	p.m.	a.m.	p.m.
1	6.2	6.50	9.27	8.40
2	6.3	6.49	10.18	9.24
3	6.3	6.48	11.8	10.10
4	6.3	6.46	11.54	11.0
			p.m.	
5	6.4	6.45	12.46	11.54
6	6.4	6.44	1.33	nil
				a.m.
7	6.5	6.43	2.19	12.51
8	6.6	6.42	3.3	1.50
9	6.6	6.42	3.47	2.51
10	6.6	6.41	4.31	3.54
11	6.6	6.40	5.16	4.59
12	6.7	6.39	6.4	6.6
13	6.7	6.38	6.52	7.13
14	6.8	6.37	7.45	8.20
15	6.9	6.36	8.39	9.26
16	6.9	6.35	9.36	10.28
17	6.10	6.34	10.33	11.25
				p.m.
18	6.11	6.33	11.31	12.16
19	6.11	6.32	nil	1.3
			a.m.	
20	6.12	6.31	12.27	1.46
21	6.12	6.30	1.22	2.25
22	6.12	6.29	2.15	3.1
23	6.13	6.28	3.7	3.36
24	6.13	6.27	3.59	4.11
25	6.14	6.26	4.50	4.46
26	6.14	6.25	5.41	5.22
27	6.15	6.24	6.32	5.59
28	6.16	6.23	7.23	6.39
29	6.17	6.23	8.14	7.22
30	6.17	6.22	9.5	8.6

Phases of the Moon.

5th April, First Quarter, 10.12 a.m.
12th „ Full Moon, 7.15 a.m.
18th „ Last Quarter, 11.3 p.m.
26th „ New Moon, 11.22 p.m.

THE OTHER WORLDS.

AT the beginning of April the two great planets, which bore each other company for eight months, will be low in the west at dark. In February, Jupiter passed Saturn for the third time, ending the rare triple conjunction which last occurred in 1683. Now Jupiter is hurrying on to the eastward, leaving the slower moving Saturn behind. We must look at them for the last time, for Saturn sets about 38 minutes after the sun and Jupiter 10 minutes later.

We have lately missed the Morning Star, Venus, which for many months heralded the dawn. She has slipped down into the brightness of the rising sun and disappeared. On 19th April the planet will be beyond the sun; a few weeks later we may look for her low in the twilight where she will become the Evening Star.

This year, in October, we shall have Mars in opposition; we have not seen this for a long time. The reason is that the fiery planet only comes into opposition to the sun once in nearly two years and two months. It rises now about half an hour after mid-night in Capricornus, not far from Alpha and Beta of that constellation, which stars mark the eyes of the Sea-goat. Capricornus follows Sagittarius, which rises after the Scorpion. About 3 a.m. on 20th April Mars will be about as far south of the waning moon as the Pointers of the Southern Cross are from each other. Mars will soon be in the evening sky, growing brighter until the time of opposition, when it will be at its nearest to the earth.

Brief reference was made last month to Cunningham's comet and, as was expected, it came and went before the Journal was published. This page is prepared six weeks before publication, and at the time of writing little was known about this visitor. While it was visible it gave pleasure and interest to millions of people who contemplated it. It was very beautiful, and because naked eye comets are rare it aroused much comment. Astronomers, however, see quite a number of distant comets each year, some of which are predictable. The last naked-eye comet was Peltier's, which passed through Capricornus, a little east of the present position of Mars, in August, 1936. In 1927 we saw comet Pons-Winnecke, which was so distant that it appeared only as a small nebula. The last comet comparable with the one we have just seen was Halley's of 1910, which is due to return in 1985. The last Great Comet was seen by those who remember 1882.

About this time of the year, the Zodiacal Light may often be quite noticeable to those who look for it, especially in West Queensland, where the atmosphere is dry and clear. This light appears after all sunlight has faded from the sky. It consists of a tall cone of faint light which lies in the ecliptic (where the sun, moon and planets are always found). Its broad base rests on the horizon where the sun has set and it tapers to a point 60 or more degrees above, where its light generally peters out. The light is very faint and ethereal, so that a young moon or a slight haze obliterates it. Under ideal conditions it reaches faintly to the meridian and down to the eastern horizon. In the meridian, just opposite the sun, a slightly brighter patch may be noticed, which is known as the Counter Glow. The Zodiacal Light may also be seen before the dawn, rising from the eastern horizon. It is considered that there is a great lens-shaped formation of fine particles of matter extending from the sun far beyond the earth. It is sunlight reflected from these particles which we see.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

THE STARRY SKY IN APRIL LOOKING SOUTH.

The illustration shows a few star groups and the Milky Way, when looking south about dark in early April. The Southern Cross is shown just above the pear-shaped black spot, half-way up the Milky Way. This black spot is known as the Coal-sack. It was once thought to be a hole in the Milky Way but it is now known to be a black nebula—an immense cloud of dust which obscures the starry background. According to Blackfellows' star-lore, the Coal-sack forms the head of a huge emu. The two Pointers to the Cross are in the long neck which opens out to form the breast and back. On clear moonless nights this black figure becomes conspicuous, when once recognized. A line through the Southern Cross and continued toward the lower right-hand corner passes a little below Achernar. If the line is drawn from Beta Centauri (the Pointer next to the Cross) to Achernar, a line dropped from the centre of this line gives the south point on the horizon. A half-way between Beta Centauri and Achernar is near the South Celestial Pole, around which all the stars appear to revolve once in every 24 hours.

The two patches, which appear like small portions of the Milky Way, are the Magellanic Clouds. They are huge star systems at tremendous distances. The smaller cloud is no fewer than 95,000 light-years distant. Light, which travels 186,000 miles a second, takes 6,000 years to traverse the cloud. The larger cloud is 112,000 light-years away and is, therefore, correspondingly larger. They are now getting rather low to be well seen.

In early times the Cross was a part of the Centaur. The Pointers formed his front feet. There are many more stars than shown, but these mark something of the figure of a Centaur thrusting a spear forward. The Pointer farthest from the Cross is Alpha Centauri, the nearest bright star to the earth; its light has taken 4⅓ years to reach us. Below this star are two stars on the edge of the Milky Way, which, with a third, forms a triangle. This is known as the Southern Triangle. In the top right is the large constellation of Argo, the Ship. The bright star is Canopus, which is second in brightness only to Sirius. Whereas Sirius is comparatively near, Canopus is very distant, 650 light-years has been estimated, but its distance is not accurately known. Above the Cross, in the Milky Way, is another, rather larger, cross lying parallel with the Southern Cross. This is the False Cross in Argo and is often mistaken for the Southern Cross by people coming south for the first time.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1940 AND 1941, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of years' records.	Jan., 1941.	Jan., 1940.
North Coast.	In.		In.	In.
Atherton	11·66	40	15·88	7·15
Cairns	16·66	59	14·43	13·19
Cardwell	16·97	69	26·54	10·45
Cooktown	14·46	65	4·48	22·24
Herberton	9·42	55	11·24	7·10
Ingham	15·82	49	26·40	16·08
Innisfail	20·39	60	26·07	25·42
Mossman Mill	18·42	28	15·16	26·80
Townsville	10·94	24	39·97	8·23
Central Coast.				
Ayr	10·95	54	20·01	4·23
Bowen	9·55	70	20·98	2·89
Charters Towers	5·34	59	10·35	4·68
Mackay P.O.	13·61	70	19·32	10·48
Mackay Sugar Experiment Station	13·30	44	..	10·17
Proserpine	15·05	38	24·03	15·56
St. Lawrence	7·79	70	7·92	2·67
South Coast.				
Biggenden	5·17	42	5·92	1·85
Bundaberg	8·29	58	10·77	2·36
Brisbane	6·36	89	12·99	7·47
Caboolture	8·02	65	8·00	4·78
Childers	7·12	46	10·43	1·01
Crohamhurst	11·93	48	11·70	6·88
Esk	5·63	54	9·38	4·79
South Coast—contd.	In.		In.	In.
Gatton College	4·28	42	8·60	3·69
Gayndah	4·59	70	5·22	5·84
Gympie	6·53	71	9·45	4·48
Kilkivan	5·58	60	6·86	3.00
Maryborough	6·99	70	8·34	2·19
Nambour	9·43	45	10·83	4·82
Nanango	4·61	59	6·41	4·51
Rockhampton	7·43	70	5·63	3·15
Woodford	7·70	54	8.59	9·61
Central Highlands.				
Clermont	4·99	70	9·45	0·51
Gindie	3·70	42	..	2·07
Springsure	4·16	72	9·26	0·91
Darling Downs.				
Dalby	3·42	71	4·00	5·28
Emu Vale	3·20	45	5·00	3·06
Hermitage	2·95	35	..	..
Jimbour	3·50	62	3·39	1·48
Miles	3·65	56	12·50	1·83
Stanthorpe	3·63	68	6·88	3·07
Toowoomba	5·09	69	11·66	5·72
Warwick	3·56	76	6·29	3·28
Maranoa.				
Bungeworgorai	2·12	27	..	0·78
Roma	3·08	67	9·30	0·80

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—JANUARY, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Divisions and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means.		Shade Temperature. Extremes.				Rainfall.	
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	..	90	79	96	24	72	5	448	12
Herberton	..	82	67	88	14	61	2	1,124	21
Rockhampton	29·86	88	73	99	14, 15	69	27	563	18
Brisbane	29·95	82	68	91	26	63	31	1,299	16
Darling Downs.									
Dalby	..	83	64	90	17, 25	58	31	400	11
Stanthorpe	..	76	59	85	17	52	28	688	16
Toowoomba	..	74	60	85	17	55	11	1,166	20
Mid-Interior.									
Georgetown	29·80	94	73	100	24	66	28	1,208	20
Longreach	29·62	89	70	101	17	60	26	1,234	16
Mitchell	29·88	82	66	90	17, 18, 19	56	29	1,103	14
Western.									
Burketown	..	90	76	100	7	68	27, 28	1,134	14
Boulia	29·81	94	73	106	15	62	4	809	6
Thargomindah	29·84	85	69	96	21	59	4, 26	527	8

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, ~~including postage~~. General Public, **Ten Shillings**, including postage.

Vol LV | 1 APRIL, 1941 | Part 4

Event and Comment

Planning for Post-War Stability.

AN important move is now under way in the Old Country for the formulation of basic principles from which will be developed a long-term agricultural policy. It is a highly significant move, not without interest to Australian producers, and probably the most important for a permanent peace-time policy that has yet been attempted. In fact, it actually involves changes in the higher direction of Government policy in which the Prime Minister himself, Mr Churchill, is taking a hand. In addition to the appointment of an executive of three senior Cabinet Ministers to deal with man-power, production, and imports, a member of the War Cabinet has been allotted the duty of preparing plans for reconstruction in Great Britain after the war as the first step towards the establishment of a Ministry of Reconstruction. This new Ministry will cover the whole field of industry and social enterprise, and will include the preparation of an agricultural policy which can fit in with the present war-time policy of guaranteed prices and markets for the duration of the war and for the first year of peace In this new policy the questions of the control of production, of prices, of markets, and of labour are involved.

Every representative section in Great Britain has already agreed that in the post-war years a sound and prosperous agriculture must be accepted as one of the fundamental factors in national policy From

the Australian producer's point of view, there is one obvious point that crops up immediately, and that is that provision should be made in any new policy for the maintenance of a balance between British and Empire producers. It is apparent that economic planning after the war will be on a comparatively new basis, and it is essential that the relationship between producers in the Motherland and producers in the Dominions should be established beforehand, so that stability and continuity in policy may be ensured for the benefit of all concerned. One interesting suggestion has been made, and that is that "another Empire Producers' conference should be held in South Africa as the most central site, so that an Empire producing policy can be established and stabilised as one huge effort, instead of the conflict of interest and competition in markets which did so much damage in recent years."

In this new move, and in the deep thought which it has evoked, there is much to serve as a reminder of the necessity of our developing our own post-war plans for a better world. It seems certain that we shall have a great influx of population when the war is over. In addition to developing our powers of absorption of migrants, provision must also be made for a satisfactory post-war settlement of the men of the fighting forces now in the field. A complete survey of our whole resources, then, suggests itself as a matter of immediate urgency. There are so many vital factors involved that a start on such a nation-wide survey cannot be made too soon.

A Post-War Policy for Producers.

THE British Press is giving a lot of space to timely discussions on agriculture and its future. The London *Times,* in a leading article (18-1-41), stressed strongly the necessity of resisting any temptation to live merely in the immediate present and "to put off as premature consideration of future difficulties until it is too late for effective action." Continuing its comment, the *Times* said:—

> The country cannot afford to expose British farming or the agriculture of the Dominions and of the other great primary producing countries, to a repetition of their unhappy experience which followed the last war. Not only are the growers of foodstuffs and raw materials the great market for secondary industries, primary production is the basis of the whole complex social and economic structure, and in the long run the health of our civilisation depends upon its health. . . . There are few more vital or more fundamental necessities than that of maintaining a reasonable stability in the prices of primary products. War conditions should help to simplify the task. They bring home to everyone the necessity of some machinery for regulating the flow of supplies. . . . In any machinery which may be set up, the Empire Producers' Councils recommended by the Sydney conference are certain to play a very important part as representing the interests of the farmers. There are, of course, other interests which also need to be taken into account, especially

those of the ultimate consumer. It is quite true. . . . that in the long run no one, not even the consumer, benefits from depressed prices and demoralised markets. It is equally true that in the long run no one, not even the producer, benefits from inflated prices, which can be just as demoralising. The legitimate dealer stands to gain from the orderly regulation of markets as much as the consumer or the producer. The only person likely to suffer is the parasite on the industry whose operations are merely predatory and whose elimination would itself be a gain. At the same time there are many reasons why it would be dangerous to entrust this regulation exclusively to associations of producers. For one thing they can only handle the problem as one of over-production, while, as was made clear by the report of Lord Astor's Committee on Nutrition, there is not too much food grown in the world, but too little. The real trouble is that so many cannot afford to buy in sufficient quantities. Producers' organisations cannot themselves do everything to make this latent demand effective, and are forced therefore to rely on restricting supplies in order to maintain remunerative prices. This is necessary in present conditions, but it is a regrettable necessity. It can only be obviated by positive and concerted action of Governments to raise standards of nutrition where they are now too low for healthy growth and development. If for this reason alone Governments, who represent the interests of the whole community, including both consumers and producers, must take a predominant part in all questions affecting food supplies and prices, which must be regarded as constituting one of the major problems of reconstruction.

A New Handbook on Horticulture.

ORCHARDISTS in every part of the State will welcome the new handbook on horticulture issued by the Department of Agriculture and Stock as the second volume of an important series designed to serve as a practical guide for Queensland primary producers. The volume, which is now available at modest cost, deals with orchard practice in its many aspects, including the selection of a site, the propagation of fruit trees, and the cultivation of tropical, sub-tropical, and deciduous fruits, as well as vegetables grown in Queensland on a commercial scale. A very valuable section of the book covers the packing and marketing of both fruit and vegetables. As most orchardists in Queensland grow a diversity of fruits, the new handbook will be accepted as a useful guide to the established grower as well as to the beginner. It is a practical work conveying concisely and simply essential cultural information based on everyday experience, and to which advisory officers of the Department have contributed freely from their store of practical knowledge gained in the course of many years of service to the Queensland fruitgrowing industry. The Queensland Handbook of Horticulture should have a place in every Queensland farmer's library.

The Lantana Leaf Bug in Queensland.

ROBERT VEITCH, B.Sc.Agr., B.Sc.For., F.R.E.S., Director of Plant Industry (Research).

THE lantana seed fly* was introduced from Hawaii to Queensland by the Department of Agriculture and Stock nearly a quarter of a century ago, and it is considered that its establishment in this State was a useful step towards the control of lantana. The fly maggots, hatching from the eggs which are laid in the lantana berries, feed in the pulp and generally attack the seeds. As a result of this infestation, the percentage of seed germinating is reduced and the berries are rendered relatively unattractive to such birds as normally feed on them and thereby distribute the seed. Hence the effect of this introduction was to retard the spread of lantana.

It was felt eventually, however, that the position was still by no means satisfactory because, in spite of the establishment of the seed fly throughout the State virtually wherever lantana occurs, this plant was still spreading to new areas and flourishing in those in which it was already established, although doubtless to a lesser degree than would have been the case had the seed fly not been introduced to Queensland. Consideration was accordingly given to the introduction of other insect enemies of lantana, and in 1936 the lantana leaf bug† was introduced from Fiji by officers of the Council for Scientific and Industrial Research.

The insect was handled under quarantine conditions in Canberra and bred up for subsequent liberation at a few selected centres in Queensland and New South Wales. A colony was made available for liberation at the Kairi State Farm on the Atherton Tableland in November, 1936, this colony consisting of 600 adult bugs. Four colonies, totalling close on 4,000 adults and nymphs, were despatched also to Rockhampton for liberation at Fairy Bower, in the vicinity of that city, between the months of October, 1937, and October, 1938. These liberations were made by local officers of the Department of Agriculture and Stock, and a sufficient period has now elapsed to warrant an attempt at an assessment of the present position.

Position in North Queensland.

The single liberation at Atherton successfully established this insect in North Queensland, and in March, 1939, it had become sufficiently abundant to be responsible for extensive defoliation and flower destruction on the original liberation site. Its numbers there were such that steps were taken to distribute colonies to other portions of the Cairns Hinterland and to lantana infested coastal areas north of Townsville. This work was commenced by departmental officers in July, 1939, and was supplemented by distribution by private individuals. As a result of this distribution, assisted to some extent by natural spread, the lantana leaf bug is now present in large numbers in the great lantana belt which extends from the Herbert River to north of Cairns and, indeed, it has been found established as far north as Cooktown. It is also established at many lantana infested centres on the Cairns Hinterland.

* *Agromyza lantanæ* Froggatt. † *Teleonemia scrupulosa* Stal.

The spread of the bug in the territory north of Townsville has thus been rather spectacular, and at many centres the effect on its host plant has been no less striking. Both the adult bug and its nymphal stages feed by sucking plant sap from the foliage and the bug also attacks the growing tips of the lantana plant. The upper surface of infested leaves rapidly assumes a speckled appearance and, when the bug is present in large numbers, these leaves become progressively more blemished and eventually the whole leaf surface presents a brown appearance, the colour change to brown working in from the leaf margin. Such severely attacked foliage appears as if it had been scorched by fire and the leaves fall to the ground. Feeding by the adult bugs is not confined, however, to the foliage and growing tips of infested plants, for they feed on the flower buds and opened flowers and, in cases of severe infestation, the attack on the various portions of the plant results in seed production being appreciably reduced. The nymphs also attack the flower buds and opened flowers. A further feature associated with infestation by this insect is the marked distortion of leaves after eggs have been laid in them. The eggs are inserted in the midrib or in the larger veins on the under surface of young leaves, and the plant cells in the immediate vicinity of these egg-laying sites die, thereby causing affected leaves to curl and become yellow in colour.

Mention may here be made of the fact that, in some cases where the bug population reached a very high level in North Queensland, certain garden plants and some other plants, which were growing wild, were attacked by the lantana leaf bug. No evidence, however, was obtained of the bug breeding on any plant other than lantana.

During the winter of 1940 large areas of lantana in North Queensland, but more particularly on the coast, presented the scorched and defoliated appearance just described The stems of the plants in such areas had died back close to ground level in many instances and, on the whole, the check administered to lantana was an extremely severe one. Occasional plants had apparently been killed by this attack, but, in most cases, regrowth from the base of these severely attacked plants took place in the spring months. Such regrowth, however, has been freely attacked by the lantana leaf bug and extensive defoliation has again taken place. It is too early to express an opinion as to the extent to which plants are likely to be killed by the lantana leaf bug in Queensland as a result of such repeated attacks and defoliation, but the experience of the next few seasons should supply a definite answer to that question. In the meantime, the results of this introduction can be regarded as gratifying and promising in so far as North Queensland is concerned.

Position in Central Queensland.

The first Fairy Bower colony, as already mentioned, was liberated in October, 1937, and the insect became established from that liberation. It was reinforced by three further colonies during the subsequent twelve months, but it has rarely shown signs of inflicting injury on the lantana at all comparable to that experienced in the Far North. Furthermore, the bug has never become really abundant at Fairy Bower at a season of the year when it would have been practicable to collect bugs there for liberation elsewhere. Several other colonies, obtained from North Queensland, were liberated in the Rockhampton district prior to the summer of 1940-41, but none of these appears to be any more promising than the Fairy Bower liberation. Between Townsville and Maryborough

liberations have been made at a number of appropriate centres during the present summer months, and perhaps some of these colonies will find local conditions more favourable to their multiplication and spread. Indeed, at several centres, the bugs of this season's liberations are at present known to be breeding actively although, of course, on a small scale.

Position in South Queensland.

A colony of the bug was liberated at Glenapp, near the Queensland-New South Wales border, in February, 1940, and when the liberation site was examined in the following December, evidence was obtained indicating that the bugs had survived the winter. Another colony was liberated in the Mount Perry district in the autumn of 1940, but it encountered heavy frosts during the subsequent winter months and may not have survived. Since December of last year, a number of colonies, again obtained from North Queensland, have been liberated, mainly for observational purposes, at selected centres between Maryborough and the southern border of the State. It is, of course, much too early to express an opinion as to the probable fate of these recent liberations. Further liberations in South Queensland are now undesirable until the advent of the 1940-41 summer months, because the cold dry conditions prevailing in the south during winter and spring are unfavourable to the establishment of the lantana leaf bug. These latter remarks might be regarded as being almost equally applicable to Central Queensland.

Summary.

The lantana leaf bug is well established in the lantana infested belt north of Townsville, and in that territory it has inflicted very severe damage on its host plant. It is now so widely distributed in the Far North that there no longer appears to be any necessity to continue the general distribution of colonies north of Townsville. Further liberations there may nevertheless be necessary to complete the distribution of the bug for there are doubtless some more or less isolated areas in which it has not yet obtained a foothold. In many portions of the lantana infested country north of Townsville the bug, of course, is still present in only relatively small numbers; it may not yet be represented on every holding in a district in which it is established, and so far it may not have inflicted severe damage on its host plant. If the experience of the last two years is repeated, however, the bug population should build up satisfactorily in those areas in which it is at present to be found only in limited numbers, and it should steadily spread from farm to farm, without the necessity for liberating colonies on individual holdings. The position south of Townsville is not so satisfactory, and there is as yet no evidence that the spectacular success achieved to date in the Far North will be duplicated in Central and South Queensland. A considerable number of colonies, however, have been liberated recently between Townsville and Maryborough, and it may be that some of these will find local conditions sufficiently congenial to enable them to inflict a severe check on the lantana. South of Maryborough a number of key centres have been selected and, at these, observational colonies have been liberated during the recent summer months. No general distribution of colonies has been undertaken in South Queensland, but it is hoped that the observational colonies recently liberated will give some indication of the possibilities of this insect in the more temperate portions of the State.

Pineapple Culture in Queensland.

H. K. LEWCOCK, M.Sc., B.Sc.Agr., Senior Research Officer.

(*Continued from page* 16, *July*, 1940.)

CHAPTER VII.—SELECTION OF LAND FOR PINEAPPLE CULTURE.

MISTAKES in land selection are always costly and may prove disastrous. Many of these result from failure to take into account all of the factors involved. For example, the suitability of land for pineapple production on a commercial scale is determined not by climate and soil alone, but also by economic and other considerations such as the availability of labour, the accessibility of markets, and the topography of the land. Though climate limits the geographical distribution of the pineapple as a field crop and the type of soil influences the yield, it is the economic considerations, which determine where and to what extent it can be profitably cultivated. In the selection of land for pineapple culture, therefore, the steps which should be followed are, firstly, the choice of a district which (*a*) is climatically suited to the crop (see Chapter VI.), (*b*) has an adequate supply of suitable labour, and (*c*) is favourably located with respect to markets or transport facilities; and, secondly, in that district, the choice of a location which is suitable both as regards topography and soil.

AVAILABILITY OF LABOUR.

Because modern methods of pineapple production entail the application of intensive cultivation practices, the first points to be considered in the selection of land for this crop are the availability of the labour required for working the plantation, and the cost of labour relative to that ruling in areas from which the product is likely to meet competition. No hard and fast rule can be laid down regarding labour requirements because so much depends on the rainfall, the topography, and the type of soil, as well as on the size of the plantation and the methods employed in its management. An excessively high rainfall, a heavy type of soil, or a steeply sloping or broken topography all add materially to the cost of the labour required to cultivate a given acreage. Labour can generally be used more efficiently on large plantations than on small ones because of the greater scope which large-scale methods of production afford for the employment of mechanical aids. However, pineapple production on a commercial scale can be undertaken successfully only where the supply of labour is adequate to meet all contingencies, including such seasonal operations as planting, weeding, and harvesting. In remote or sparsely settled districts the casual labour needed to carry out these operations on any but small holdings is not always obtainable when required.

MARKETING AND TRANSPORT FACILITIES.

Because of the perishable nature of the product, the location of a pineapple plantation in relation to markets or transport facilities is often decisive in determining whether the crop can be profitably cultivated or not. In fact, the economic advantages accruing from proximity to outlets such as large urban populations or canneries are frequently so great as to more than offset slight disabilities with respect

to climate or soil. It is to secure advantages such as these that the pineapple industry in Queensland has developed chiefly in the south-eastern portion of the State, despite the existence further north of large tracts of country which, climatically, topographically, and with respect to soil conditions, are better suited to the production of this crop than most of those now under cultivation. In other parts of the world, such as Malaya, Formosa, and the Hawaiian Islands, the establishment of canning facilities has made possible the development of pineapple-growing as an important industry in localities where only a very limited demand for the fruit previously existed.

In addition to the location of the plantation with respect to fresh fruit markets, canneries, and transport facilities, due consideration should also be given to the character of the roads leading to them. The advantages of a good connecting road are obvious.

TOPOGRAPHY.

Quite apart from the question of location, the prevailing topography or lay of the land is an important factor in determining its suitability for pineapple culture. The relation which exists between topography and climate, particularly as it influences the occurrence of frost, has been discussed in Chapter VI.; it remains now to consider the manner in which topography may affect the economic utilization of land.

Steeply sloping ground is not only difficult and expensive to cultivate, but when it is brought under cultivation it is so subject to erosion that rapid impoverishment of the soil occurs unless special protective measures are employed. These are expensive and inevitably add to the cost of production. For similar reasons, rough or badly broken land is poorly adapted to pineapple culture. Where the land is rough, cultivated areas must necessarily be small in extent and irregular in shape. Under such circumstances, cultural operations are invariably expensive to carry out, with the result that an economic level of production is difficult of achievement, irrespective of the nature of the climate, soil, or location. While moderately hilly country can be profitably utilized for pineapple culture, provided care is exercised in the selection and laying-out of the fields, where a choice is available preference should be given to land which has only a gentle gradient, not only because it is less costly to work, but also because it is less subject to both erosion and frost. However, an exception to this rule should be made in the case of soils which are retentive of moisture. When soils of this type are used for pineapple culture, a hillside plantation site is essential in all but exceptionally well-drained locations. For a similar reason, low-lying areas and depressions should always be avoided, irrespective of the type of soil, since few crop plants are as exacting as the pineapple in regard to drainage and soil aeration.

SOIL SELECTION.

Even where climate, location, and topography are favourable, it is on the character of the soil itself that the profitable utilization of land for pineapple culture depends. But while the suitability of the preceding factors may be readily assessed even from a cursory inspection of the proposed plantation site, considerably greater care is required to estimate the value of the soil. This is particularly the case in southern Queensland, where a variety of related soil types, differing in their suitability for pineapple culture, may occur over relatively small areas. In fact, it is

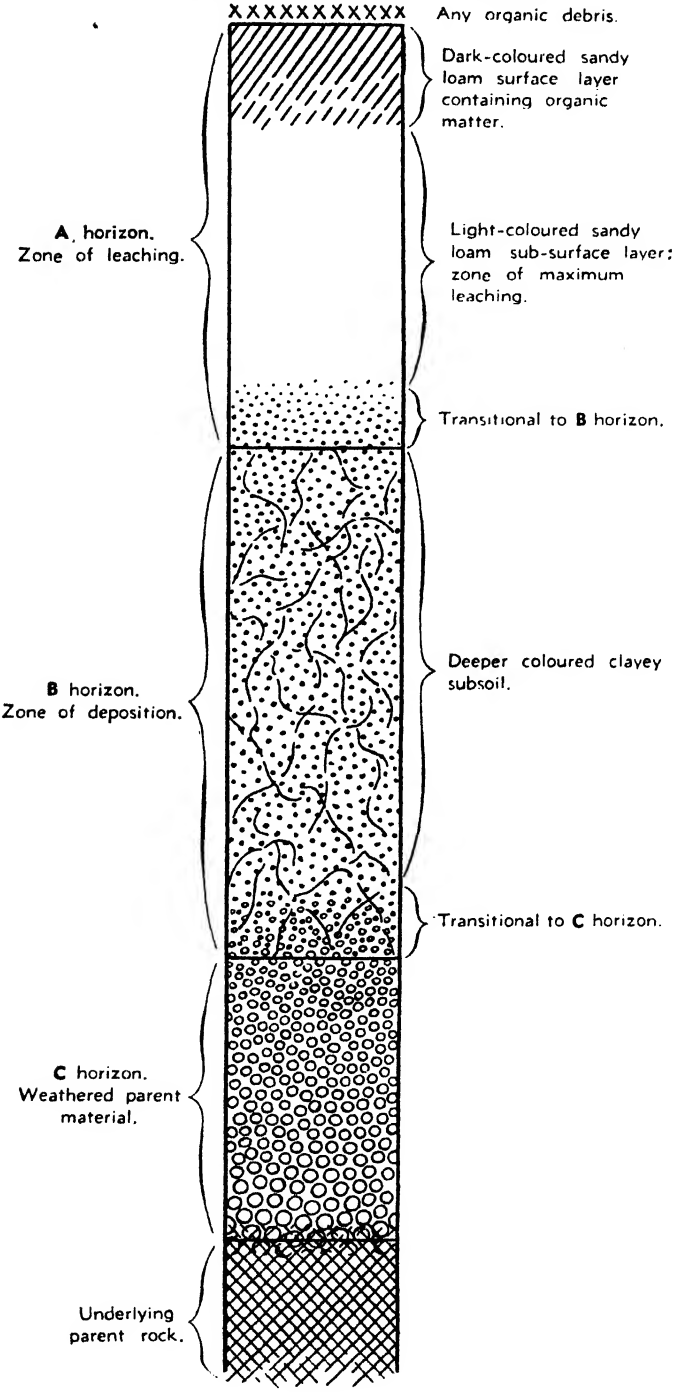


Plate 54.

SIMPLIFIED DIAGRAMMATIC REPRESENTATION OF A MATURE FOREST SOIL PROFILE.—Seldom does any soil show this complete profile, though much of it is found in many soils. In cultivated soils the dark-coloured surface layer of the A horizon may be entirely wanting, due to the combined effects of erosion and oxidation.

the exception rather than the rule to find a holding on which the soil is of a uniform type throughout. Consequently, a choice has usually to be made between two or more soils which may differ greatly in their suitability for pineapple production. The soundness with which this choice is made will depend on the skill and care employed in interpreting the indications provided by differences in the texture and colour of the various soil types and by changes in the natural vegetation.

In a preceding chapter it was pointed out that the suitability of a soil for pineapple culture is determined chiefly by its moisture relationships. Since the nature of the deeper layers often exerts a profound influence on the moisture relationships of the root zone, the selection of a soil for pineapple culture should begin with the examination of a face of soil to a depth of several feet. In order to appreciate the significance of the changes in texture, structure, and colour which may occur in a soil at different depths, however, a general idea as to the probable manner of its formation is necessary.

Soil Formation and the Soil Profile.

Soils are formed by the breaking-up and decomposition of rocks. In tropical and subtropical regions, this rock disintegration is brought about chiefly by the action of heat, water, and air, and is known as *weathering*. The type of soil which is ultimately formed is determined by (1) the nature of the parent rock and (2) the degree of weathering which has taken place. High temperatures and moist conditions accelerate the weathering process; low temperatures and dry conditions retard it. Ultimately, a soil reaches the stage when it exhibits a more or less well-developed *profile*—that is, a series of superimposed layers of varying thickness, colour, and texture (Plate 54). These different layers of soil are known as *horizons*, and they develop partly as a result of chemical change and partly from the addition or removal of solid and dissolved substances by the water which moves through them. The downward movement of substances in solution from one horizon to another is known as *leaching*, and in moist climates the character of the soil which is finally formed is influenced very greatly by the amount of leaching which has taken place. Since movement of water through the soil is predominantly downward only when the amount which penetrates it in the form of rain is in excess of that removed by vegetation or lost by evaporation, it follows that under similar rainfall conditions leaching increases in intensity as the natural plant cover thins out or the soil is brought under cultivation. In the coastal districts of southern Queensland, the surface horizons of so-called "scrub" soils, which in their virgin state support a dense growth of jungle or rain forest (Plate 55), are typically less leached than those carrying a more open type of vegetation—e.g., the so-called "forest" soils.

In the latter, the soil profiles are more strongly developed than they are in the scrub soils and the layer from which material has been leached (the surface or "A" horizon) is often well differentiated in colour and texture from the underlying subsoil or "B" horizon in which the leached materials have been redeposited. In addition to removing most of the soluble material, the unimpeded movement of water in such soils tends to wash out the finer soil particles from the surface layers and carry them downwards into the subsoil, so that the latter becomes heavier in texture than the surface soil and thus less permeable to water.

Eventually an impervious layer or "hardpan" may form in the subsoil as a result of the fine clay which fills the pore spaces cementing the larger particles together into a hard, stonelike mass. In the soil profile, such a deposition zone is clearly differentiated from the adjoining layers by its compactness, its fine though gritty texture, and its darker colour. A long period of time is required for the full development of a deposition zone such as that described, but even where cementation has not yet occurred any downward movement of clay particles which has taken place must have the effect of reducing the permeability of the subsoil.

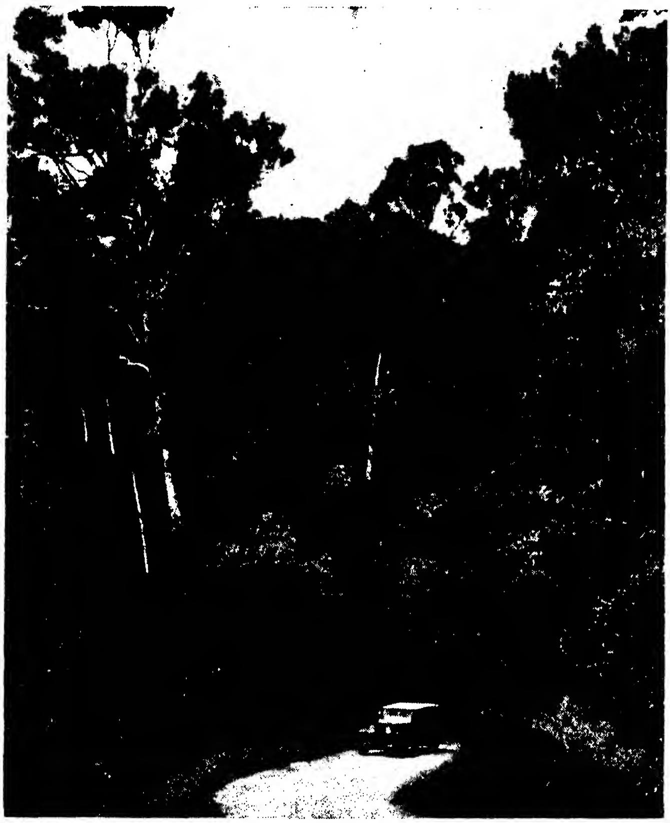


Plate 55.

TYPICAL "SCRUB" (RAIN FOREST) OF THE QUEENSLAND COAST.

Alluvial Soils and their Formation.—Transport of soil particles through the agency of water occurs not only in a downward direction, but also laterally. As everyone is aware, much eroded material is carried away from the place of its origin in the water that runs off the soil surface following heavy rain. The distance which this suspended material may be transported before it is deposited varies according to the velocity of the water and the size of the particles. Sooner or later, however, it all settles out, first the larger particles and then the smaller, to be again built up into deposits of soil which may differ greatly in texture, colour, and other properties from the substratum on which they rest. Soils which are formed gradually in this way from water-borne

material are termed *alluvial* soils, in contrast to those which are formed *in situ* from parent rock—i.e., *residual* soils. Alluvial soils occur chiefly as river flats or deltas. In southern Queensland, soils of this type are seldom suitable for pineapple culture, despite their relatively high fertility, because the low situations in which they are normally found render them subject to frost—e.g., the river flats of the Mary Valley. However, the extensive alluvial formations which occur as deltas at the mouths of several North Queensland rivers, notably the Burdekin and Don rivers, have been shown to be extremely well suited for pineapple culture, and, in fact, are possibly unexcelled for this purpose by any soils elsewhere in the State.

Because an alluvial soil is formed by the superimposition of successive layers of water-borne material, any variations in colour or texture which occur in its profile are due not so much to weathering and leaching as to changes in the velocity or course of the stream which built it up. For this reason, it is not uncommon for the subsoil, or B horizon, of an alluvial soil to be coarser in texture than the surface soil, though such is rarely the case in residual soils. Differences such as this are often useful in determining how a soil was formed.

The Examination and Interpretation of the Soil Profile

For the reasons which have been outlined, the selection of soils for pineapples should begin with an examination of the soil profile. To do this, pits at least 3 to 4 feet in depth should be dug wherever variations in the natural vegetation indicate that soil differences are likely to occur. If the sites for these pits are carefully chosen, a very small number will suffice to give a clear picture of the soil conditions obtaining generally over the area under consideration.

In the examination of a soil profile, the first points to observe are (*a*) the extent to which organic debris has accumulated at or near the surface, if at all; (*b*) the depth of the underlying A horizon—i.e., the layer of soil which extends from the surface down to the first well-marked change in texture or colour; (*c*) the size, character, and frequency of occurrence of any stony material which may be present in the A horizon; and (*d*) the height of the water table, if this is apparent at the depth to which the soil profile has been exposed.

An accumulation of decaying leaves and other ground litter in association with a deep brown colouration of the surface soil indicates a high organic matter content in this layer, and also that little or no erosion has taken place. With rare exceptions, the intensity of the brown colouration and the depth to which it extends is a reliable guide to the amount of humus present in the soil. Absence of a ground litter and little colour differentiation between the surface and subsurface layers—except in red or dark-coloured soils—is indicative of a deficiency in humus, due either to a sparse vegetation cover or to denudation of the surface layer by erosion. Soils which exhibit an acute lack of humus in their virgin state can seldom be made suitable for pineapple culture.

Since the zone of root penetration of the pineapple plant should lie wholly within the A horizon of a soil, the deeper this horizon is the better. A depth of anything less than 8 or 9 inches is likely to prove unsatisfactory, and at least 12 to 14 inches of top soil is desirable. Where serious erosion has occurred, as on cultivated slopes which have lacked protection against storm-water damage, the A horizon may be very

shallow (Plate 56) or even non-existent. Soils which have been depleted of their surface layers in this way are wholly unsuited for pineapple culture. (Plate 57).

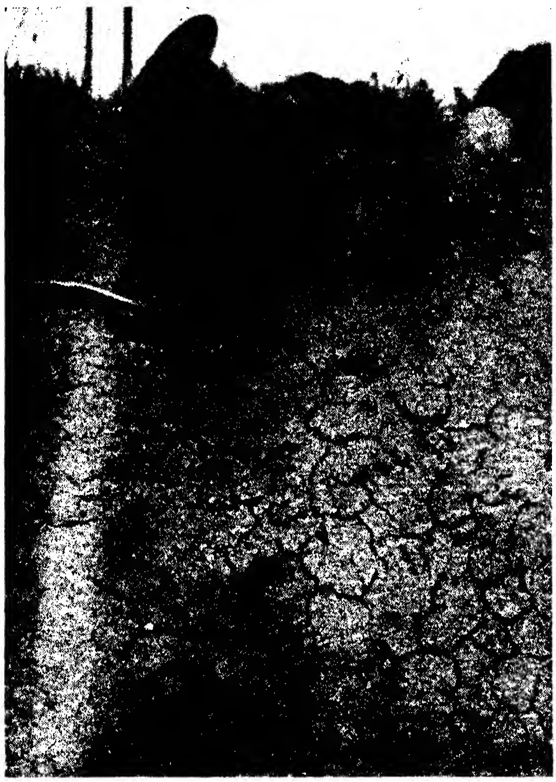


Plate 56.

PROFILE OF A SOIL FROM WHICH THE A HORIZON HAS BEEN ALMOST COMPLETELY ERODED SO THAT THE CLAY SUBSOIL NOW OCCURS WITHIN A FEW INCHES OF THE SURFACE.—The high clay content of the subsoil is indicated by the presence of cracks on the dried face of the cut.

Provided the surface layers are free from stones large enough to interfere with tillage operations, the presence in a soil of fragments of undecomposed rock is not objectionable. In the heavier types their presence may even prove beneficial, because such fragments tend to open up the deeper layers and thus promote drainage. On the other hand, a gravelly layer underlying a sandy A horizon is undesirable; the latter drains out so rapidly that even after a brief period of dry weather crop plants are unable to obtain sufficient water from it to fully meet their requirements. Immature or "young" soils—i.e., those in which the process of weathering is still incomplete—are frequently characterised by the presence of a considerable proportion of sharp-edged rock fragments of varying size. Older residual soils contain only rounded fragments of resistant material such as quartz or ironstone, and the state of division of the soil particles in the various layers is more uniform than it is in "young" soils. The agricultural significance of this distinction lies in

the fact that, in wet climates, a mature or weathered soil has undergone a high degree of leaching, with the result that most of the soluble materials which were present originally in the A horizon have been washed down into the subsoil. As these include nitrogen, potash, phosphoric acid, and other substances essential for plant growth, "old" soils are relatively less fertile than "new" ones. The red and chocolate coloured soils of the Mary Valley are good examples of the latter, while those of the Beerburrum area are typical "old" soils.

Plate 57.

FAILURE OF PINEAPPLES PLANTED ON AN AREA FROM WHICH THE A HORIZON HAS BEEN REMOVED BY EROSION.—Despite the fact that the plants in this field have been heavily fertilized, and also that the ground surface has been mulched with peanut shells, growth is stunted and weak wherever the subsoil is exposed.

As pointed out in an earlier chapter, the water table has little effect on the moisture relationships of the A horizon of a soil unless it lies within a few feet of the surface. In areas which are topographically suited for pineapple culture, a dangerously high water table is not likely to be encountered unless the total depth of soil which overlies the parent rock—i.e., the A, B, and C horizons together—is abnormally shallow. Even then it is improbable that the water table itself can be observed in the soil profile, except during the rainy season, so that due warning should be taken from such indications as are provided by a shallow C horizon or by rock masses protruding into the soil profile.

Significance of Soil Texture and Structure.—As explained in Chapter V., the movement of water in a soil—and, consequently, that of air also—is determined chiefly by its texture and structure. The changes which may occur in these two properties at various levels in the soil profile, particularly in the A and B horizons, provide an easily interpreted and reliable indication of the moisture relationships of a soil as they affect pineapple production.

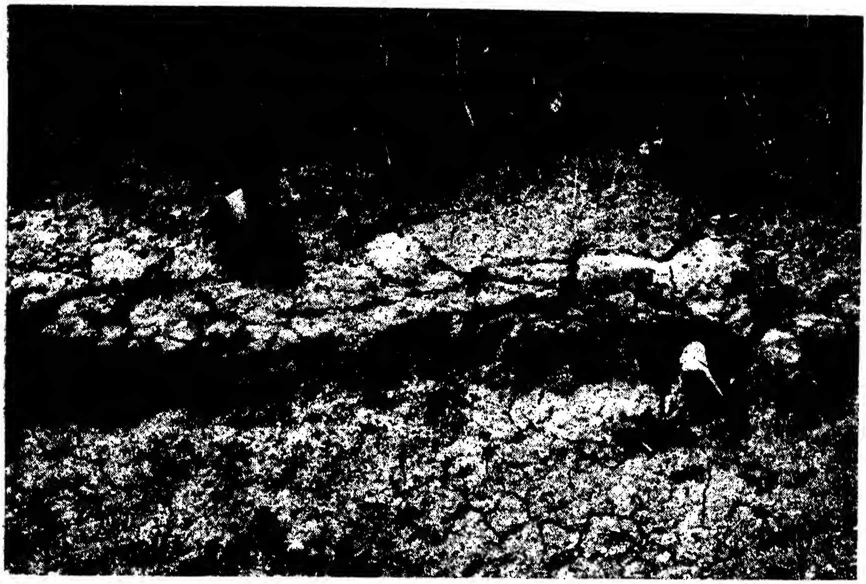


Plate 58.
An Exposed Profile of a Highly-Leached Virgin Forest Soil in which a Shallow Sandy A Horizon Overlies an Impermeable Clay Subsoil.

The best soils for pineapple culture are those of medium texture—that is, loams and sandy loams—and it can be said with assurance that the deeper the loamy texture extends, the better adapted will a soil be for this purpose. Fine-textured soils—i.e., those of clayey consistency—are suitable only when they possess a particularly well-developed crumb structure, or when they overlie a sandy subsoil. On the other hand, coarse-textured, single-grained soils, such as the sands, are prone to dry out too rapidly unless they contain an abundance of organic matter—which is rarely the case—or grade into a considerably finer-textured subsoil. In selecting soils for pineapple culture very careful consideration should be given to the influence of the texture of the deeper layers on the moisture relationships of the root zone. Where the first marked change in the profile, proceeding from top to bottom, is in the direction of a coarser-textured or more sandy layer, the effect is to increase the drainage of the top soil. Conversely, if the B horizon is finer in texture than the A horizon, as is frequently the case in the coastal districts of southern Queensland, drainage of the root zone is impeded.

Except in moist locations or in the case of fine-textured clayey soils, a sandy subsoil is undesirable because it results in a too rapid drying-out of the A horizon in the same way as a layer of gravel. On the other hand, a subsoil which is sharply differentiated from the adjoining layers

by its higher clay content—particularly if a large proportion of this clay has been washed down from the A horizon—tends to be so closely compacted that percolation of water through it occurs only with difficulty. Where a definite hardpan is formed by the cementing together of the sand and clay particles the barrier to water movement is even more complete. Obviously, soils in which such a formation occurs are wholly unsuited for pineapple culture, since they tend to become waterlogged in wet seasons and drought-stricken in dry ones. It is not so generally recognised, however, that the cultivation of sandy soils overlying only moderately clayey subsoils is attended with risk if the latter approach too close to the surface (Plate 58). Many of the weak yellow patches which appear in pineapple plantations in the coastal districts of southern Queensland during the winter and spring months, even on virgin soils, are attributable to this cause alone. Great care should be exercised to ensure that no land is selected for pineapple culture in which a clayey subsoil occurs less than 10 inches from the surface.

From the foregoing discussion, it will be apparent that sharp breaks of any kind in the textural or structural properties of the profile of a residual soil are undesirable, since they indicate an extreme degree of weathering. The best type of profile is one in which the texture gradually increases in fineness from a loam or sandy loam at the surface to a clay loam in the subsoil (Plate 59). In addition to possessing better moisture relationships. such a soil is likely to be more fertile than one which exhibits clearly defined horizons in its profile.

Significance of Soil Colour.—Because the colour of a soil is determined by its organic matter content and permeability as well as by the nature of the rock material from which it was formed, there is often an intimate relationship between soil colour and productivity. Generally, though not invariably, dark-coloured soils are of greater value agriculturally than light coloured ones. As already pointed out, a brown colouration in a surface soil is largely due to its content of humus: the higher the humus content the darker the colour. Consequently, dark-coloured soils usually exhibit a well defined crumb structure and possess a relatively high level of fertility. If such soils suffer a loss of humus, either through faulty cultivation or as a result of erosion, they lose colour as well as productiveness. On the other hand, grey, yellow or other light-coloured soils are deficient in humus, possess little or no structure and are relatively low in fertility. Such soils normally support a much sparser type of plant cover than dark-coloured ones and this chiefly accounts for their lighter colour, due to the fact that the amount of organic matter which is returned to the soil from an open forest type of vegetation, for example, is much less than it is from luxuriant jungle or scrub. In heavy rainfall districts, however, a dark grey or black colouration of the surface soil is often indicative of faulty drainage, since it results more from changes which iron compounds undergo in the presence of accumulated organic debris under waterlogged conditions than from a high humus content of the soil itself. The existence of such conditions in low-lying areas and depressions accounts for the characteristically dark colour of swamp soils even when they are very coarse-textured.

For many years, the soils which were most sought after for pineapple culture in southern Queensland were those with a pronounced reddish or reddish-brown colouration. In general, this preference was well founded because a red colour, increasing in intensity from surface

soil to subsoil, is indicative of good aeration and good drainage. Soils of various types exhibiting this general characteristic occur in all districts between Redland Bay and Gympie: they are especially well developed on the Blackall Range where they have been formed by the weathering of iron-bearing basaltic rocks. The predominantly red colour of such soils is due to the fact that the iron which they contain is chiefly in the form of stable, insoluble ferric compounds which form only in the presence of air. In light sandy soils which contain only a relatively

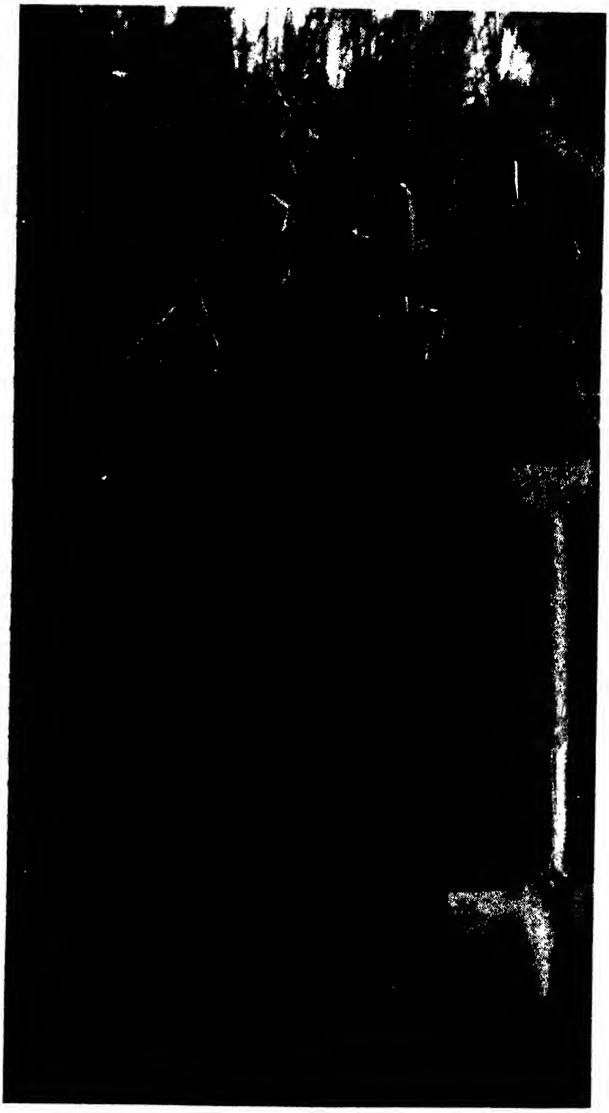


Plate 59.

PROFILE OF A VIRGIN SCRUB SOIL IN WHICH THE TEXTURE GRADUALLY INCREASES IN FINENESS FROM A SANDY LOAM AT THE SURFACE TO A CLAY LOAM IN THE SUBSOIL.—The relatively unleached character of such a soil is indicated by the absence of clearly defined horizons in its profile.

small proportion of iron, the red colour of these ferric compounds may be largely or even completely masked by the brown or brown-black colour imparted by organic matter.

The colour of a soil is rarely uniform throughout its depth; on the contrary, it usually exhibits considerable variation at different levels and it is from these variations that valuable deductions may be made regarding its aeration and drainage and the extent to which the surface layer has been eroded. In a general way, it can be safely assumed that the deeper the brown colour of the surface soil the greater the proportion of organic matter which it contains, and the smaller the degree of erosion which has taken place. In coarse-textured soils, the colour of the subsoil is commonly lighter than that of the surface soil on account of its lower organic matter content, except where iron has leached out of the surface layer and been redeposited at a lower level. Should this have occurred the colour of the subsoil will be red or yellowish-red if the drainage is good, or bluish-grey or yellowish-grey if it is defective. As previously pointed out, a reddish colouration indicates that the iron occurs as ferric compounds which form only under conditions of free aeration. However, when air is excluded or driven off from a soil, as it is in swampy or waterlogged areas, much of the iron which is present is not fully oxidised and occurs in the form of unstable ferrous compounds. These impart a bluish-grey or mottled appearance to the deeper layers of soils in which they occur and, because of the unfavourable moisture relationships which they denote, such soils should under no circumstances be planted to pineapples.

Assessing the Chemical Fertility of a Soil from a Field Examination.

No matter how favourable its moisture relationships, a soil cannot be cultivated profitably unless it is able to furnish the growing crop with all that it requires in the way of mineral nutrients. If these are not present when the soil is brought under cultivation they must be added subsequently in the form of fertilizer or manure. It is important to know, therefore, whether the soil under consideration contains a sufficiency of available mineral plant foods to meet the needs of the crop which it is proposed to plant and, if not, which of them must be added and to what extent. This aspect of pineapple production will be discussed in a subsequent chapter. In the present connection, however, it is necessary to point out that the notion that a soil analysis will provide all this information in a readily intelligible and wholly reliable form is far from being true. An analysis of a single soil sample considered apart from climate, the conformation of the soil profile, and the degree of soil variability which occurs in the area from which it was taken, may not merely have little value but may even be misleading. The only entirely reliable guide to productiveness of a soil when planted to a given crop is a properly conducted field trial, supplemented by intensive laboratory investigations. In the absence of such data, however, a very useful estimate of plant food resources of a soil can be gained from the soil profile, considered in conjunction with the vegetation cover.

As already pointed out, the presence of well-defined horizons in the profile of a residual soil indicates that its A horizon has been highly leached. This means, in the case of a shallow-rooting crop such as the pineapple, that most of the soluble compounds have been washed down below the zone of root penetration. Such soluble compounds include any nutrient material present in a form available to

plants. Soils which exhibit these features, i.e., "old" soils, are generally deficient in all of the mineral plant foods, so that when they are brought under cultivation for pineapples it can safely be assumed that the addition of "complete" fertilizer mixtures will be necessary from the outset. In the coastal districts of southern Queensland, soils which fall into this category include practically all of the forest types as well as some of the lighter scrub soils. On the other hand, alluvial soils and "new" residual soils, which show little evidence of leaching, may contain moderate or even large amounts of one or more of the elements required by plants. With the exception of nitrogen, the proportion in which the various minerals are present in such soils, and the extent to which they are available to plants, depends largely on the nature of the rock from which they were formed and the conditions under which its disintegration took place. While this can be readily ascertained in the case of residual soils, it is not easy to determine for alluvial soils except by microscopic examination and chemical analysis. Most volcanic soils of recent origin, and particularly those formed from basalt, are generally rich in potash and fairly well supplied with phosphoric acid. A good example of this class of soil is the red basaltic loam of the Blackall Range. Among alluvial soils, those of the Burdekin and Don deltas in North Queensland contain a relatively large amount of both phosphoric acid and potash in readily available form.

In contrast to phosphoric acid and potash, the nitrogen content of the A horizon of a soil is determined not by the nature of the rock from which it was formed but by the extent to which organic matter has accumulated in it. Thus a soil may be well supplied with the former nutrients but be deficient in nitrogen, or *vice versa*. It rarely happens, however, that a soil which lacks either phosphoric acid or potash is rich in nitrogen because a deficiency in one essential element limits the growth of the natural vegetation, the cyclic decay of which contributes to the soil most of the organic matter it contains. An equally important limiting factor in this connection is rainfall. Thus it is that in dry areas such as the Burdekin delta, where natural vegetation is very sparse except during the rainy season, the soils are deficient in nitrogen though well supplied with other nutrients. It will be apparent also, that under similar climatic conditions soils which support a dense growth of scrub will possess a much higher nitrogen content in their surface layers than those carrying open grass forest. Though it is true that much of this nitrogen is unavailable to plants until the material containing it has undergone bacterial decomposition, under tropical or subtropical conditions this takes place rapidly once the land has been brought under cultivation. In fact, in scrub soils it is often desirable to retard decomposition by shading the soil in order to prevent loss of soluble nitrogen due to leaching. The marked loss in fertility which many scrub soils exhibit after a relatively short period of cultivation is due chiefly to depletion of their humus and nitrogen content.

Native Vegetation as a Soil Indicator.

Though the character of the natural vegetation which a soil supports has long been regarded as one of the best indexes of its fertility, the indications provided by vegetation alone are not always wholly reliable, particularly in eucalyptus forest country. In the first place, removal of the natural plant cover for the purpose of land utilization often leads to profound changes in the soil conditions which made its development

possible. What are regarded as scrub soils or forest soils, described in terms of their natural vegetation, may cease to retain any distinguishing characteristic after a few years of cultivation. In the case of the medium and coarser-textured scrub soils particularly, three or four years of cropping will suffice to exhaust a capital of plant foods which took thousands of years to build up: under bad soil management, even a deep bed of organic refuse will vanish in a very short time in the moist tropics and sub-tropics, with consequent rapid loss of nitrogen.

The second reason why natural vegetation cannot always be relied upon as an indicator of soil fertility is because the conditions which favour the vigorous development of a plant cover consisting largely of deep-rooting trees are not necessarily adapted to the production of crops such as the pineapple. For this as well as other shallow-rooting field crops, the character and density of undergrowth, rather than the size and vigour of trees, is the safer guide to the agricultural value of a soil. Over limited areas, however, variations in the natural vegetation, including native trees, may provide valuable clues to some of the physical properties of the soils which support them, particularly as regards moisture relationships. In fact, the connection between physical properties and vegetation is generally fairly close for any locality over which the climatic factor is uniform. For this reason, a knowledge of natural vegetation as related to the main soil profiles occurring in any one locality is extremely useful in selecting land for cultivation, since areas in which drainage is likely to be defective can be recognised at the outset, and thus be eliminated from further consideration before the examination of soil profiles is begun. The latter should never be omitted, however, since, at best, the indications provided by vegetation tell only whether profile examinations are worth carrying out.

Within the limits defined, either individual plants or groups of different plants possessing similar growth requirements may serve as soil indicators. In southern Queensland, for example, a luxuriant growth of blady grass (*Imperata arundinacea*) in open forest country usually denotes a well-drained, medium-textured soil of good depth; under similar climatic conditions a sparse ground vegetation consisting chiefly of dwarf, prickly shrubs is indicative of a shallow, compacted, or badly eroded soil. Similarly; the occurrence of the paper-barked tree (*Melaleuca viridiflora*) is invariably associated with poorly-drained or swampy conditions. Many other plant-soil associations exist in the eucalyptus forests of the coastal pineapple districts, the commoner of which are as follows:—

Species which generally indicate medium-textured soils of good depth, permeability, and moisture-holding capacity—

Tallowwood (*E. microcorys*).—Generally occurs in localities not subject to frost.

Blackbutt (*E. pilularis*).—A somewhat cosmopolitan species, but occurs chiefly on the better types of soil.

Forest Oak (*Casuarina torulosa*).—This species frequently occurs in association with Blackbutt.

Scrub Box (*Tristania conferta*).—As its name implies, this tree is often encountered on the edges of scrub (rain forest) on reddish-coloured fine-textured loams.

Species which generally indicate deep, well-drained sandy ridges—

Bloodwood (*E: corymbosa*).—A cosmopolitan species, but attains its best development on deep, well-drained soils.

Grey Ironbark (*E. paniculata*).—This species occurs more frequently in poorly developed form as the dominant tree on hard, gravelly ridges.

Species which generally indicate hard, gravelly ridges—

White Stringybark (*E. eugenioides*).—This tree occurs only on the driest ridges.

Grey Ironbark (*E. paniculata*).—On this type of location, this species is often established as the dominant tree, but it may occur also in association with Spotted Gum.

Spotted Gum (*E. maculata*).

Species which generally indicate shallow, sandy soils with compact clay subsoils—

Scribbly Gum or White Gum (*E. micrantha*).—Wherever this species occurs it is an indication that the soil is so badly drained as to be of no value for agricultural purposes.

Honeysuckles (*Banksia* spp.).

Spear Grass (*Heteropogon* and *Aristida* spp.).

Soils of this type carry only a sparse ground cover, the undergrowth consisting mainly of prickly, narrow-leaved shrubs.

Species which generally indicate slow-draining clay loams and clays—

Grey Gum (*E. propinqua*).—Occurs on either ridges or flats.

Red Stringybark (*E. resinifera*).—This species prefers well-sheltered positions.

Turpentine (*Syncarpia laurifolia*).—The roots of this species frequently penetrate down to the water table.

Species which generally indicate fine-textured alluvial soils, usually in low-lying, moist situations—

Blue Gum (*E. tereticornis*).—This species favours river flats.

Apple-tree (*Angophera subvelutina*).—Often occurs in association with Blue Gum on river flats and in other locations where frosts are likely to occur.

Species which indicate swampy and waterlogged soils—

Paper-barked or Broad-leaved Tea-tree (*Melaleuca viridiflora*) and allied species.

Swamp Oak (*Casuarina glauca*).

Swamp Mahogany (*Tristania suaveolens*).—Also occurs occasionally on moist alluvial flats.

Bungwall Fern (*Blechnum serrulatum*).

Sedges and Allied Plants.—These invariably indicate swamp conditions.

[TO BE CONTINUED.]

ROSELLAS.

The selection of a sound, fertile seed is the most important point in rosella growing. Seeds grown in this State are generally of good quality, because of the long maturing season, due to absence of frost.

Any moderately good soil will grow rosellas well, but if the crop is to be grown on a large scale, a soil with a clay subsoil close to the surface should be avoided.

The seeds are usually planted out in a seed bed in spring, and the plants when 6 inches high set out in rows about 6 feet apart. If the grower is not disposed to start his seeds from beds, the seed may be planted where the bushes are to remain.

Thorough cultivation is essential and weeds should be kept in check, as they affect seriously the growth of the plants.

When the fruit is mature, it is advisable to lose no time in picking it, as the fruit stalk has a tendency to toughen, thereby making gathering a slower task than it should be.

Bean Fertilizer Investigations during 1940.

W. A. T. SUMMERVILLE, M.Sc., Senior Research Officer.

CONSIDERABLE progress was made during the 1940 coastal bean-growing season with departmental fertilizer experiments subsidised by the beangrowers. Although the work is still far from complete, it is felt that some of the information obtained will be of immediate interest and value. Accordingly, the chief results obtained to date and the lines along which it is proposed to continue the work during the present season are discussed in this article.

Experiment 1. Location: Nambour Field Station.

In this experiment the plots were laid down in the form of randomised blocks, with the plots, to which the lime was added, paired so as to make them continuous and thus facilitate the application of lime. All plots received a dressing of nitrogen in the form of sulphate of ammonia; half the plots received lime; and half received either phosphoric acid in the form of superphosphate or potash in the form of sulphate of potash. The yields from these plots demonstrated very clearly the value of phosphoric acid, the increase in yield due to the addition of phosphoric acid being highly significant. With respect to potash, the yield figures suggested that this element had no effect, whether the results were computed on weight of beans, number of beans, or quality. The outstanding observational point, which was also borne out by the yield figures, was the very poor results, both with respect to plant growth and yield, which followed the application of nitrogen in the absence of phosphoric acid. Without exception, in the absence of phosphoric acid, the plants were stunted, of poor quality, and commercially useless.

Experiment 2. Location: West Cooroy.

On this site the split block arrangement of plots was used, the treatments being all possible combinations of nitrogen, phosphoric acid, and potash. Yields in this experiment showed highly significant increases where nitrogen was supplied, but with respect to other elements there were no significant differences. At first sight this result would appear to be at variance with that obtained at Nambour in Experiment 1, but it is essential to examine the history of the land before arriving at any conclusions. In the Nambour work the plots were located on land of extremely low fertility and which had never previously received any fertilizer treatment. The Cooroy plots, on the other hand, were located on land which had been producing beans for a number of years and which had been regularly fertilized. Furthermore, at Cooroy the fertilizer which had been used regularly contained an abundance of phosphoric acid, which compound, in recent years, had been included partly in the form of bone, from which it would, no doubt, be but slowly available. It appears, then, that the results which were ostensibly brought about by an application of nitrogen were in reality due to nitrogen plus residual phosphoric acid, and these results then would be quite compatible with the results obtained in the Nambour experiment. The absence of significant differences between the nitrogen-phosphoric acid and nitrogen plots strongly suggests that phosphoric acid had been used in previous years in excess of requirements, and the results

open up the question of the most profitable way of applying phosphoric acid. The alternatives are (*a*) that small applications of phosphoric acid be given each year, and (*b*) that the phosphoric acid be given in larger amounts at, say, three-year intervals. This aspect will be referred to in connection with proposals for further work. On this plot, again, there was an entire absence of any response to potash.

Experiment 3. Location: Calico Creek.

The growth of plants on this plot was greatly reduced on account of the abnormally poor growing conditions which obtained over the greater portion of the season. Not only did this dry weather reduce the growth of plants in general with a consequential reduction in yield, but it also accentuated differences due to position, such as in slight hollows, which would otherwise not have occurred. In this experiment the one noteworthy feature was that there was evidence of a decrease in yield in the presence of potash in certain instances, notably when nitrogen was also used. It would, however, be rather dangerous to draw any very definite conclusions from this evidence. although the figures show statistical significance. However, coupled with the absence of any increases following the application of potash in all other experiments, the result here is certainly interesting.

Experiment 4. Location: Goomboorian.

In this experiment no significant differences were obtained with any material. The only suggestion which can be made from this experiment is that, in this instance, the residual effects were such as to have a masking effect on the applications made in this work. It is to be noted particularly that on this soil, which is red volcanic, a deficiency of potash was anticipated, and consequently a particularly heavy application of this element was given, without, however, the slightest effect either of increase or decrease in yield.

Experiment 5. Location: Nambour Field Station.

This work took the form of a pot experiment designed to show the effects of fertilizer placement on germination and was done as a preliminary to the field experiments described above. The outstanding result obtained was in connection with sulphate of ammonia. It was found that if this element were placed in close proximity to the seed, even in small concentrations, marked decreases in germination took place. Neither phosphoric acid nor potash appeared to have any detrimental effect on germination when placed close to the seed, and indeed phosphoric acid appeared to have a slight accelerating effect without any influence on the percentage of germination. In order to further examine the effect obtained from sulphate of ammonia, another experiment was conducted in which seed was soaked in solutions of ammonia, nitrate of soda, calcium nitrate, ammonium nitrate, potassium nitrate, potassium permanganate and pure water. It was found that in no case was the germination impaired following these treatments. This suggested that the interference with germination observed in the pot tests was not a direct chemical one, but that the soil in some way entered into the question. This would suggest either bacteriological influence or a chemical change which occurred when sulphate of ammonia was added to the soil. The work probably throws some light on poor germination which occurs from time to time and which growers usually

attribute to the seed itself. That this poor germination is only encountered irregularly even under the same fertilizer practices is in all probability due to soil moisture conditions, which in turn would influence both bacterial action and chemical interaction. The observations are of direct importance in the matter of fertilizer placement, and from these results and those which are reported in the literature from other parts, it is obvious that work on fertilizer placement is of great importance.

Observations suggest that the success of a bean plant is determined largely in the very early stages of its growth. It seems, therefore, that fertilizer placement must be such that there shall be no interference with the germination and therefore the fertilizer should be placed some little distance from the seed; at the same time it should be placed close enough to ensure availability to the plant in the early stages of its growth. This opens up a question of pressing moment.

Summary.

The results of the 1940 season's work may be summarised as follows:

1. Nitrogen and phosphoric acid must be added as artificial fertilizer for the successful growth of beans on all types of soil on which the work was done, namely schist, basaltic loam and trachyte alluvials.
2. The value of potash in bean fertilizer for the production of fresh beans is extremely doubtful. It is to be noted that no information has been obtained with respect to seed production, all results being based on yield of fresh beans.
3. In so far as the quality of beans is concerned, although in certain instances phosphoric acid alone gave yields as high as nitrogen-phosphoric acid, the quality of beans was improved when nitrogen and phosphoric acid were combined.
4. Counts of twisted and other malformed beans were made and there was no evidence that any of the elements, nitrogen, phosphoric acid, potash or calcium had any effect in this connection.
5. Sulphate of ammonia applied too close to the seed may, under certain conditions, definitely impair germination.
6. The investigation will be advanced a further stage during the present bean season when it is anticipated that experiments will be carried out with the object of obtaining information on the amount of each material that should be used, and on the time and method of its application. To this end a series of levels tests has been planned, whilst differential times and placements will also be the subject of investigation.

CHANGES OF ADDRESS.

Suggestions for Conserving and Increasing the Production of Beeswax.

H. HACKER, Assistant Research Officer.

IN view of the present large and increasing demand for beeswax it is to the advantage of every beekeeper to increase wax production as far as possible, and for this purpose the following hints are offered to everyone keeping bees.

It is often noticed that actual wastage of wax occurs in the smaller apiaries. This is mainly due to one of two causes; either the beekeeper considers that the small quantity of wax obtained at each honey extraction does not justify the purchase of a wax press, or he considers that the quantity is not sufficient to be worth the trouble of saving. The cappings are often kept with the intention of melting down at some future time, but they are generally left lying about until destroyed by mice and wax moths. It is considered that it would be profitable for any beekeeper with six or more colonies to purchase a wax press, for the few pounds outlay would soon be regained by the much higher percentage of wax recovered by this method. To the owner of one or two colonies it is suggested that he melt down each lot of cappings at the time of honey extraction. The small cakes of wax will then be safe from wax moths and may be saved up in a tin or other mouse proof container until a quantity sufficient for sale has accumulated.

The production of wax can be increased if beekeepers practise deep cutting when uncapping for the extraction of honey. Instead of merely shaving off the cappings, the cut should be made well down the walls of the cells, indeed the comb may be almost entirely cut away, leaving only the midrib with the base of the cells on either side. The bees will readily draw out the combs again to the required depth and the amount of wax secured will be much greater than would be obtained by the usual uncapping method.

A stricter culling of combs is also recommended and at intervals every comb, both in the brood chambers and in the supers, should be closely examined for this purpose. When an apiary has been established for some years many of the brood combs will have become hard and black. These dark combs should be removed and melted down whenever an opportunity offers to withdraw them from the brood chamber, and they should be replaced with full sheets of foundation. A number of combs will also be found in which the top rows of cells are oval in shape; these stretched cells are usually caused by loose or improper wiring. All such combs should be removed as they waste a considerable amount of space in the brood chamber owing to the fact that the queen bee refuses to lay in cells which are not of normal shape and size. Combs containing an undue proportion of drone cells and also defective combs showing holes or combs of irregular shape should also be removed and melted down. In every case the substitution of new foundation for aged brood comb will improve the condition of the hive and in addition will release a quantity of wax for sale.

Planting Tomatoes.

H. BARNES, Director of Fruit Culture and R. L. PREST, Instructor in Fruit Culture.

THE advantages and disadvantages of cultural practices in the raising of plants of any kind from seed are always a fruitful source of discussion and argument.

So far as they concerned tomatoes, the Department decided last year—because tomatoes are an important source of livelihood to many growers—to make a series of small scale tests in the Redlands district, and the outcome will be most interesting to growers. The results should not be regarded as final. The experiments will be repeated again this season, but it is considered that as some growers may wish to try the various methods used for themselves, the information should be made available to them at this stage.

The first experiment was made during the winter using the variety, "Salads Special." In this instance, two methods were tried.

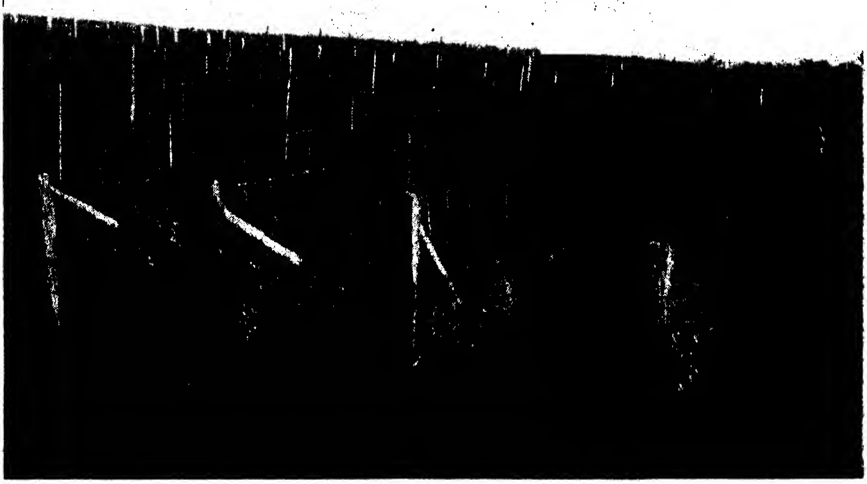


Plate 60.
TRELLISED TOMATO PLANTS IN THE REDLANDS DISTRICT.

(*a*) First, was the customary practice of growers of planting seed in a well prepared seedbed, and when the plants were large enough, planting them out without soil round the roots;

(*b*) Second, was a system of double rooting the plants by digging them out of the seedbed when about 1½ to 2 inches high and transplanting them to flat trays. The trays were made by splitting lengthwise old bushel dump cases and were thus about 18 inch x 14 inch. x 4 inch. deep. They were filled to a depth of three inches with good soil and compost, and the seedlings transplanted to them at a distance of about 2½ inches apart each way. Each tray thus held about 30

plants. The plants were transplanted in the field at the same time as the plants dug from the seedbed, i.e., when about 6 inches high. The system of planting from the trays was to cart the trays on to the field and knock out one side. The plants were then cut out with a block of soil measuring about 2½ inch x 2½ inch by 3 inch deep and planted with the soil adhering to the roots. The longer roots, of course, were cut but many of the smaller roots were undisturbed. One most noticeable feature was that after transplanting the plants showed no visible signs of drooping such as could be seen with the plants taken straight from the seedbed. The plants in both the (*a*) and (*b*) trials received exactly the same treatment, fertilizer, water, &c., and they were all trellised. During the first few weeks of growth, the plants from the trays showed stronger growth than those from the seedbed but later, because all were growing vigorously it was not easy to distinguish any difference.

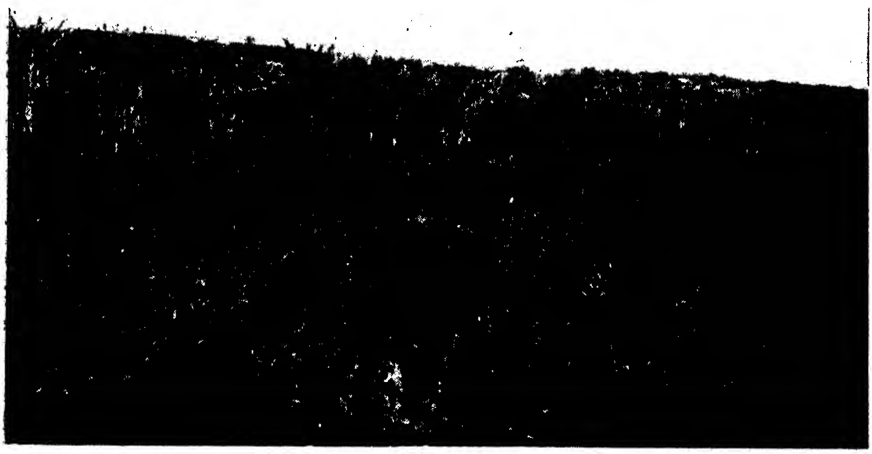


Plate 61.

TOMATOES GROWN AS A GROUND CROP—REDLANDS DISTRICT.

There was no apparent difference in earliness of maturity of the fruit but total yields at the finish of the harvest showed that the plants in the (*a*) plots which were planted straight from the seedbed produced an average of 7.2 lbs. per plant, whilst the plants in the (*b*) plots which were planted from the trays yielded an average of 8.2 lbs. per plant. Worked on an acreage basis, this would mean an estimated yield of 2,091 cases from the (*a*) plots and 2,381 cases from the (*b*) plots—a difference of 290 cases per acre, which on an estimated value of 5s. per case, means a difference of £72 per acre in favour of the tray method of planting.

The second experiment was made with the Spring crop, using the Break of Day variety. Three methods were used. Firstly, the trials (*a*) and (*b*) as set out above were repeated, and almost the same

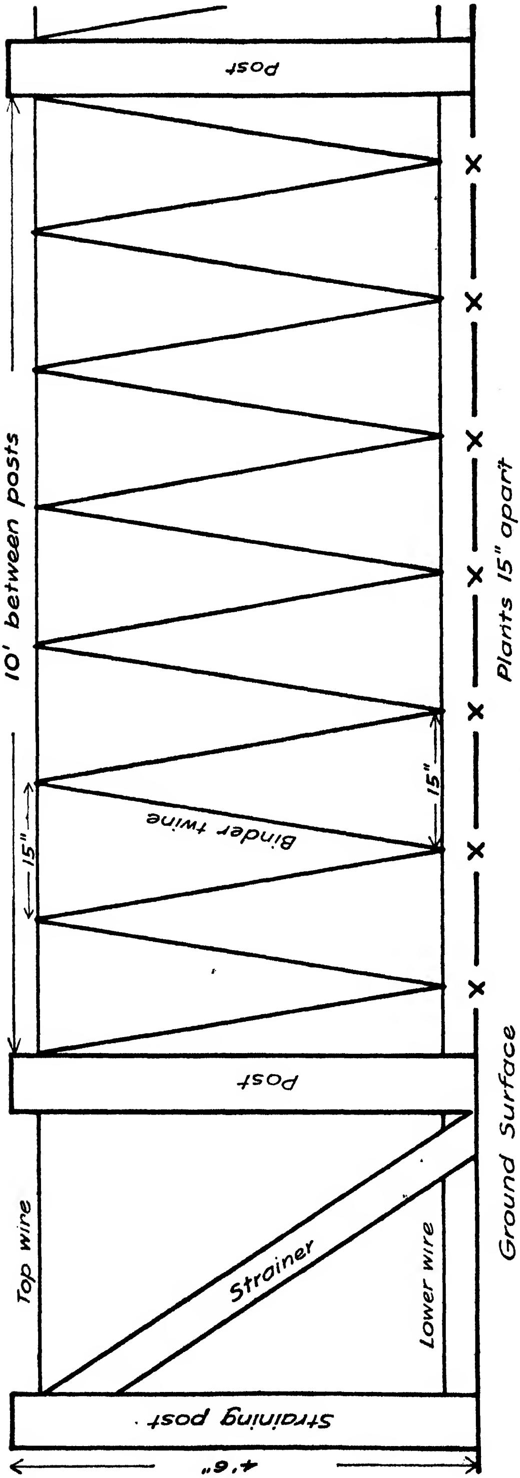


Plate 62.

DIAGRAM SHOWING MATERIAL REQUIRED AND HOW TO ERECT A TRELLIS FOR TOMATOES.

difference in cropping was obtained. The plants transplanted from the seedbed averaged 6·06 lbs. of fruit per plant, and those from the trays yielded 7.10 lbs. per plant, a difference of 1.04 lbs. per plant in favour of the trays.

Secondly, the usual method of planting was compared with a method known as "blocking," which is a variation of the tray method. In this instance, the plants were raised in the usual way in the seedbed and when 1½ to 2 inches high were thinned out to about 3 inches apart, those remaining being left to grow until large enough to plant out. The blade of a wide hoe was then pushed down into the bed between the rows of plants and the bed cut into 3 inch squares with a plant in the middle of each. The hoe was then inserted under the plants at a depth of about 3 inches and the plants removed with 3 inch cubes of soil adhering to the roots. They were placed in trays and carted to the field and planted out at the same time as those from the ordinary seedbed. In this instance, the latter plants averaged 6.45 lbs. of fruit per plant, whilst those which were blocked and planted with the cube of soil around the roots, yielded 8.45 lbs. per plant, a difference of 2 lbs. per plant in favour of the "blocked" system.

In the third trial, single plants were raised in tubes made of light cardboard and reinforced paper fabric. They measured 4 inches long and about 3 inches in diameter and were filled with soil. At the time of planting in the field the tubes were removed and the plants set out in the field with the soil adhering to the roots. They were planted at the same time as plants planted in the usual way by growers from a seedbed. In this instance, the plants taken from the seedbed yielded an average of 6.30 lbs. per plant, whilst those raised in the tubes produced 7·78 lbs. per plant, a difference of 1·48 lbs. per plant.

In summing up the observations from these trials, it is noted that in every instance where plants were transplanted with soil adhering to the roots, there was a substantial increase in the crops produced. Additionally, in the presence of wilt and target spot, the vigour of the plants set out in soil offered them an advantage over weaker plants. It seems, therefore, that growers would be wise to exercise greater care in transplanting and to endeavour to obtain their plants with soil adhering to the roots. As has been indicated, these are first trials and whilst for this reason neither traying, blocking, nor tubing is particularly advocated, it is likely that the method of thinning out in the seedbed and subsequently removing the plants with cubes of soil adhering to the roots will appeal most to growers because it entails somewhat less labour. There is, however, in practice, little difference in the labour required for "blocking" and the "tray" method. Tubes are not regarded so favourably because of the tendency of the soil in the top of the tube to dry out and hinder germination of the seed, and also because the cardboard and reinforced paper fabric tubes have a tendency to rot at the bottom where they are constantly damp.

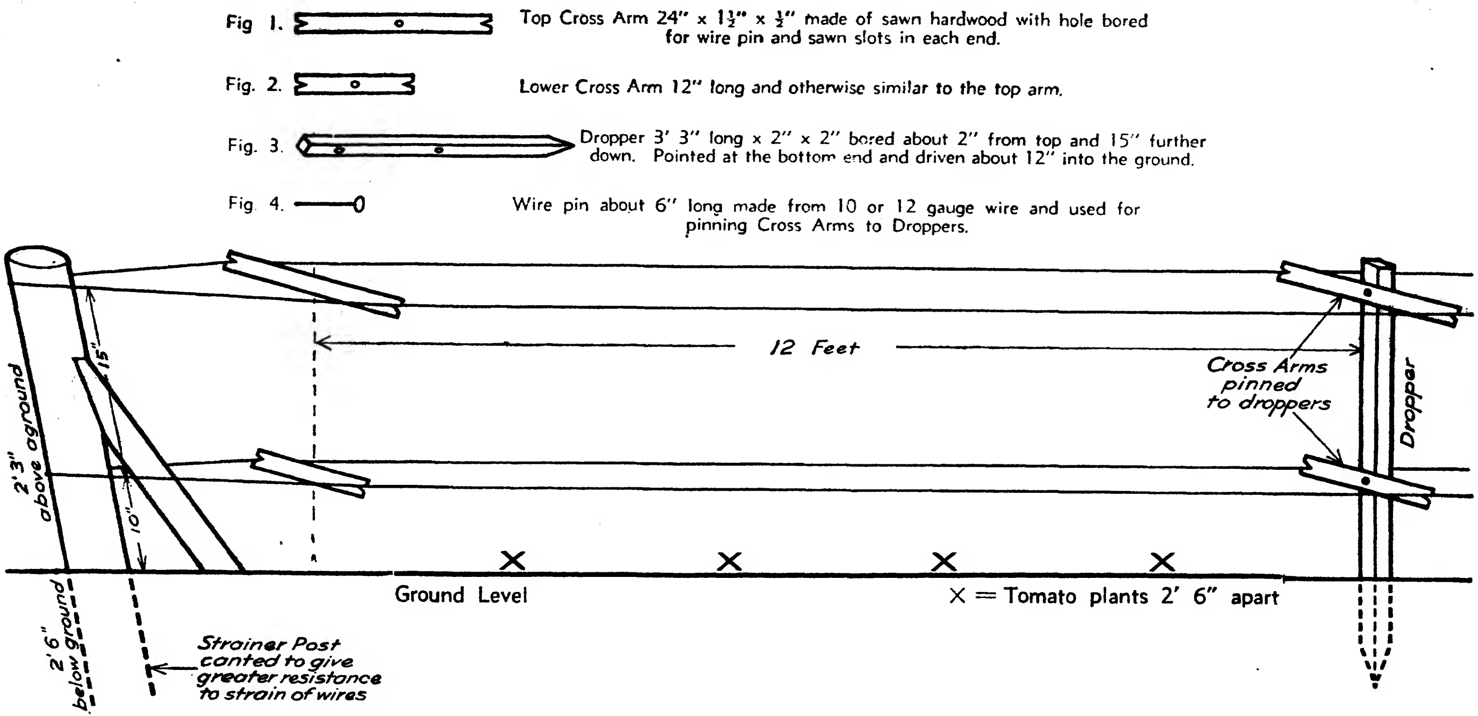


Plate 63.

LOW TRELLIS TO AVOID PRUNING.—The trellis is approximately 27 inches high. The plants are set out 30 inches apart, and as they develop are turned over the wires and allowed to grow towards the ground again. No pruning is required.

Red Flowered Lotus or Bird's Foot Trefoil (*Lotus Coccineus*).

A POSSIBLE DANGER TO STOCK.

E. H. GURNEY and C. T. WHITE.

(*Contribution No.* 12 *from the Poison Plants Committee of the Department of Agriculture and Stock, Brisbane, established as a result of a grant from the Australian Wool Board.*)

Description.

Lotus coccineus, illustrated in the accompanying photograph, is an anuual herb about a foot high, the leaves and young stems clothed with appressed hairs. The leaves are composed of three terminal leaflets like a trefoil or clover, and in addition have two leaflets at the base of the leaf-stalk, the whole leaf ½ to ¾ inch long. The flowers are red and 1-3 at the ends of short lateral branches, each group subtended by a leaf. Each flower is typically pea-shaped, dark red in colour, and about one-third of an inch long. The pod is narrow and about 1½ inches long; seeds numerous, dark brown, mottled with black, and one line in diameter.

Distribution.

A native of Western Australia, South Australia, New South Wales, and Queensland. It is not found outside Australia.

Botany.

The group of plants comprising the genus *Lotus* is widely spread over the temperate regions of the world. From the characteristic arrangement of the leaves into five leaflets, three at the end and two at the base of the leaf-stalk, the members are known at Bird's Foot Trefoils. Two species have been recognised as natives of Australia: *L.australis* and *L.corniculatus.* The latter is a yellow-flowered species, widely spread over the temperate world, including the southern States of Australia. The former is confined to Australia and is widely distributed throughout the continent. In New South Wales it is frequently known as Barwon River Lucerne, and is regarded as an excellent fodder, though dangerous under certain conditions, due to the presence of a cyanogenetic glucoside. The species dealt with in the present paper was originally described by the German Botanist Schlechtendal in 1848 as *L.coccineus,* but later was reduced by Bentham in the "Flora Australiensis" to a variety (var. *parviflorus*) of *L.australis.* It seems so constantly dissimilar to *L.australis* however, that we consider it should be retained as a distinct species.

Method of Analysis.

The method of analysis used by us was that of Finnemore (*Aust. Journal of Pharmacy,* 30th January, 1935, p. 41) with the slight modification that the distillate was collected in a saturated solution of sodium bicarbonate.

The analyses were made on the moist material as received, a moisture determination being made at 105 deg. C.) at the same time as the determination of HCN and then the HCN calculated in terms of moisture-free plant. Emulsin used in all determinations.

Plate 64.

RED-FLOWERED LOTUS OR BIRD'S FOOT TREFOIL.—Branch of plant (natural size), seed, flower and pod enlarged

Two specimens of *Lotus coccineus* have been received for analysis. The first sample received July, 1938, was too small for quantitative determination of HCN, but gave very definite HCN qualitative tests.

The second sample received from Goondiwindi was in flower. It was analysed in two portions, viz.: A—the whole plant, and B—the young green tops about 6 inches long.

A—the whole plant contained 79.8 per cent. moisture, and 34 mgm. HCN per 100 grms. of green material, equivalent to 168.3 mgm. HCN per 100 grms. of moisture-free plant.

B—the young green tops about 6 inches long contained 80.3 per cent. moisture, and 51.2 mgm. HCN per 100 grms. of the green plant equivalent to 260 mgm. HCN per 100 grms. of the moisture free plant.

The figures above indicate that the plant must be regarded as dangerous to stock.

QUEENSLAND SHOW DATES FOR 1941.

April.

Dalby ... 1st and 2nd
Tara ... 4th and 5th
Chinchilla ... 8th and 9th
Boonah Patriotic Bushman's Carnival 14th
Miles ... 16th
Taroom Campdraft Show 28th, 29th, and 30th
Kingaroy ... 30th April, and 1st and 2nd May

May.

Monto ... 30th April and 1st May
Goondiwindi ... 2nd and 3rd
Longreach ... 5th to 7th
Mundubbera ... 7th and 8th
Nanango ... 8th and 9th
Wallumbilla ... 9th and 10th
Blackall ... 12th and 13th
Roma ... 14th and 15th
Gayndah ... 14th and 15th
Murgon ... 15th to 17th
Beaudesert Show ... 14th and 15th
Beaudesert Campdraft ... 16th and 17th
Warrill View ... 17th
Mitchell ... 21st and 22nd
Barcaldine ... 21st and 22nd
Biggenden ... 22nd and 23rd
Blackbutt ... 23rd and 24th
St. George ... 23rd and 24th
Charleville ... 27th to 29th
Ipswich ... 27th to 30th
Kalbar ... 31st

June.

Wowan Bushman's Carnival ... 6th
Maryborough ... Postponed
Lowood ... 6th and 7th
Childers Patriotic Carnival 9th and 10th
Boonah ... 11th and 12th
Bundaberg ... 12th to 14th
Gin Gin Horse Show and Carnival 16th and 17th
Gladstone ... 18th and 19th
Rockhampton ... 24th to 28th
Toogoolawah ... 27th and 28th

July.

Mackay ... 1st to 3rd
Proserpine ... 4th and 5th
Bowen ... 9th and 10th
Charters Towers ... 10th to 12th
Nambour ... 10th to 12th
Ayr ... 11th and 12th
Townsville ... 15th to 17th
Laidley ... 16th and 17th
Rosewood ... 18th and 19th
Ingham ... 18th and 19th
Cleveland ... 18th and 19th
Cairns ... 22nd to 24th
Gatton ... 23rd and 24th
Innisfail ... 25th and 26th
Atherton ... 29th and 30th
Crow's Nest ... 30th and 31st

August.

Pine Rivers ... 1st and 2nd
Home Hill ... 1st and 2nd
Royal National, Brisbane 11th to 16th

September.

Imbil ... 5th and 6th
Canungra ... 6th
Pomona ... 12th and 13th
Rocklea ... 13th
Beenleigh ... 19th and 20th

Shade and Ornamental Trees and Shrubs for the Pig Farm.

C. T. WHITE, Government Botanist and E. J. SHELTON, H.D.A. Pig Section.

RECENTLY numerous references have been made in publicity work to the use of Carob Beans as a stock food and of the value of this tree in the agricultural world generally.

Carob Beans should be quite suitable for pig food if used in combination with other foodstuffs; the tree is suitable for growing in the cooler portions of the State and seed can be obtained without great difficulty. The Carob Bean tree has also been referred to as St. John's Bread. It is both attractive and provides abundant shade.

Henry and Morrison in their popular "Feeds and Feeding" say of Carob Beans that the seeds are imbedded in a thick fleshy pod, rich in sugars, which forms about 89 per cent. of the fruit. The ground pods and seeds form Carob-bean meal which in America is used chiefly in certain mixed feeds especially calf meals. It contains only 5.5 per cent. protein thus differing from most legume seeds.

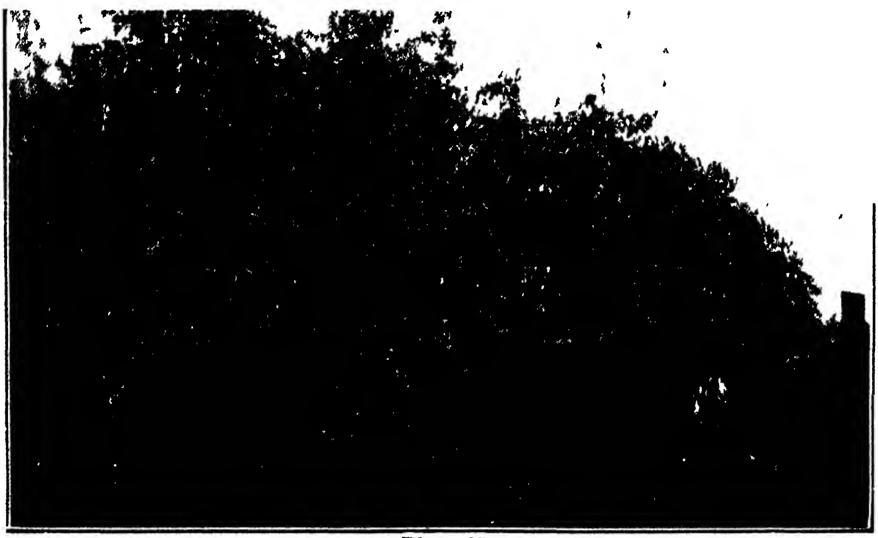


Plate 65.

BUDELIA SCRUB-PROVIDING SHADE FOR PIGS AT THE FARM HOME FOR BOYS AT WESTBROOK.

Honey Locust.

Another shady attractive tree best used as a well trimmed tall hedge is the ornamental Honey Locust (Gladitschia triacanthos) a native of North America. In good years and if the tree is suitably pruned it bears an abundance of pods relished by stock. These pods contain a honey-like substance very sweet and nutty in flavour and the fibrous portion appears to be readily digestible. Seeds of this tree are available at seed stores and while young, the upright growing shoots should be protected by a strong tree guard, in fact, it is useless attempting to grow any trees in or around a piggery unless the trunk is well protected by a tree guard through which the pig cannot poke his mouth and nose.

A Popular Shrub.

An attractive easily grown and popular shrub, both ornamental and useful and particularly suitable for Queensland conditions, but not bearing edible pods, is that known as Budelia or Chinese Lantern, a beautiful bushy attractive shrub with silvery leaves and yellow blossoms.

Of all the shrubs suitable for shade for pigs, this is probably the best as it is free growing, carries abundant foliage and is practically evergreen. Pigs like to rest under the shade of its branching arms and no matter how they worry the soil so long as the trunk and bark is protected, the shrub will flourish and is readily grown from cuttings.

A notable instance of the success of this shrub is at the Farm Home for Boys, Westbrook, where it is regularly grown and is well liked (see plate).

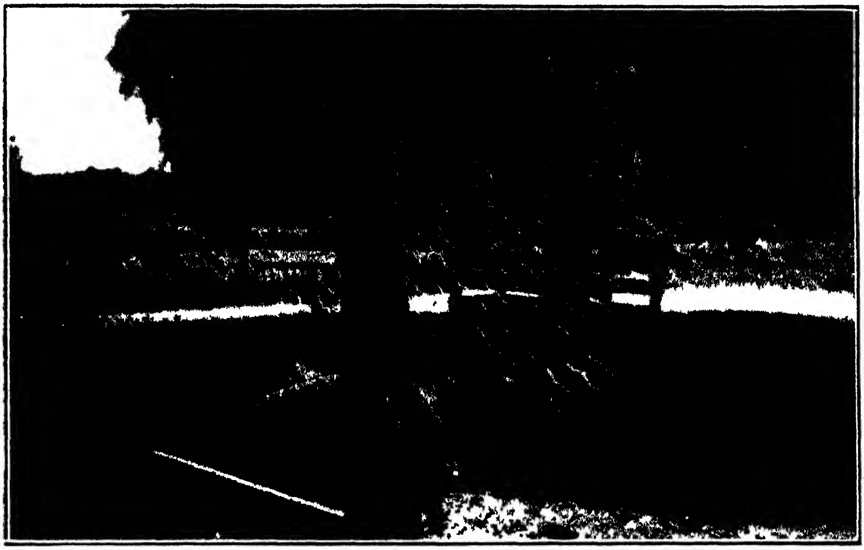


Plate 66.
Abundant Shade is an Essential in the Well-run Piggery.

Persons ordering from a nursery firm are advised to specify the variety "Madagascariersis" the one with yellow flowers, the varieties with the purple flowers, though more popular with gardeners, are barely robust enough to be of value as shade for piggeries and poultry runs.

As shade and attractive trees other than these one could mention Phytolacca or Bella Sombra as one of the best.

Trees bearing poisonous seeds (like White Cedar) should not be grown near piggeries for the white and brown berries of this tree are definitely poisonous to pigs. Weeping Figs are useful especially in the coastal belt and the fruit is non-poisonous, but somewhat laxative if eaten in any quantity.

Other figs which can be used are the Moreton Bay Fig (both the large and small leaved varieties) and the Port Jackson Fig.

The Portuguese Elm is another useful tree, which does well over a wide climatic range. The best variety is *Celtis Sinensis*. This is quite naturalised in parts, and has run out along the Burnett River at Gayndah.

If contemplating planting a few trees for shade around pig yards, and you are doubtful about the variety to plant, readers are advised to get in touch with the Department, when advice as to the best species for the locality will be given.

PASTURES FOR PIGS.

Although young pigs will not grow rapidly if given only bulky foods—such as pasture—because of the limited capacity of their digestive tract, approximately one-third of their diet may consist of good pasture. In the case of dry sows, four-fifths of the diet may be provided as pasture.

Pasture, being relatively cheap fodder, should be used to the greatest economic capacity in pig feeding. Not only does grazing provide pigs with cheap food, but it provides a measure of insurance against deficiencies of minerals and vitamins which are likely to occur when pigs are intensively housed and hand-fed.

Pigs require a relatively high proportion of protein in their food, and they are unable to cope with large amounts of fibre; it is therefore desirable to graze pigs on pasture or forage crops when they are young and succulent.

Annual forage crops have the advantage of yielding large quantities of green feed in a short time; also, the practice of ploughing and planting pig paddocks twice a year is a satisfactory method of providing sanitation and control of parasites in the piggery. However, some permanent pasture is usually desirable in the piggery, but it should be stocked lightly and given frequent rests to preserve the stand and to prevent fouling of the paddock.

Wherever it can be grown, lucerne provides the best permanent pasture for pigs, but to prevent the pigs from rooting and spoiling the lucerne plants their snouts should either be cut or ringed. When lucerne cannot be used, Kikuyu grass is a very good substitute. Kikuyu has the advantage of being able to withstand severe grazing and rooting, and will quickly recover from drastic treatment by the pigs. It is a palatable and nutritious grass, and will thrive under a wide range of climatic and soil conditions.

Root crops, with the exception of carrots, are very low in vitamins A, B, and D, so that when they form a large part of the pigs' diet care should be taken to have good pasture available or to feed an allowance of yellow maize.

The Indian Jujube—A Useful Fruit, but a Possible Pest.

WRITING to the Department from Woodstock, near Townsville, recently, Mr. J. J. Neville stated:—

"When I was at the R.N.A. show, I noticed two plates of Chini Apples on display. I would like to point out that this pest is spreading extremely rapidly this last few years on account of stock cultivating a taste for them. Many seeds are swallowed by the stock, and when passed in the manure, about 90 per cent. germinates and in this way they soon become established. Many years ago, settlers here paid 2s. 6d. each for Chini Apple trees and there is no need for me to tell you the result. At the present time many passing motorists call here for a spade to dig up small Chini Apple trees to take up North. Perhaps it would be a good plan to place an article in the *Queensland Agricultural Journal* from time to time, pointing out the menace of this pest."

The Government Botanist (Mr. C. T. White) states that the tree commonly known in North Queensland as Chini Apple, or more frequently as Chinee Apple), and which has become a minor pest around some coastal towns from Rockhampton northwards, is the Indian Jujube (*Zizyphus mauritiana*). Two species of Zizyphus are known as Jujubes; the temperate China Jujube (*Zizyphus jujuba*) and the more tropical Indian Jujube (*Zizyphus mauritiana*). The former is much cultivated in China, and to a limited extent in the United States. The fruits are mostly eaten after being boiled in syrup and dried, the processed fruits being sold as Chinese Dates.

The Indian Jujube is a native of Mauritius, India and South-west China, and is regarded as a valuable fruit.

Mr. D. G. Hancock, Inspector, Diseases in Plant Acts, at Townsville, has reported on this plant as follows:—

"It is abundant on the flat land surrounding Townsville, and the undulating country around Charters Towers and Ravenswood. In general it seems to prefer the drier and more arid situations, and is a tough hardy plant, flourishing where few other plants do well. As a rule it forms a rather ragged and untidy bush or small tree up to about 12 feet high, but occasionally it may grow to about 20 feet. It is profusely armed on the younger branches with sharp hooked spines. The bushes are normally many-stemmed, but around Charters Towers it is often seen in the form of a small standard tree with a single trunk and shapely dense head. This is due to goats having eaten off all side shoots within reach. It will plainly stand drastic cutting back, and can be trained to form a dense impenetrable hedge. Early in the season, the foliage is bright green, but later a black fungus develops on the under sides of the leaves.

"It has been seen to blossom shortly after the close of the summer rains and continues until about May, the fruits maturing during the winter months and until about September. Fruits of individual trees vary considerably in size, shape and palatability. These outwardly resemble small crab apples or large cherries. The

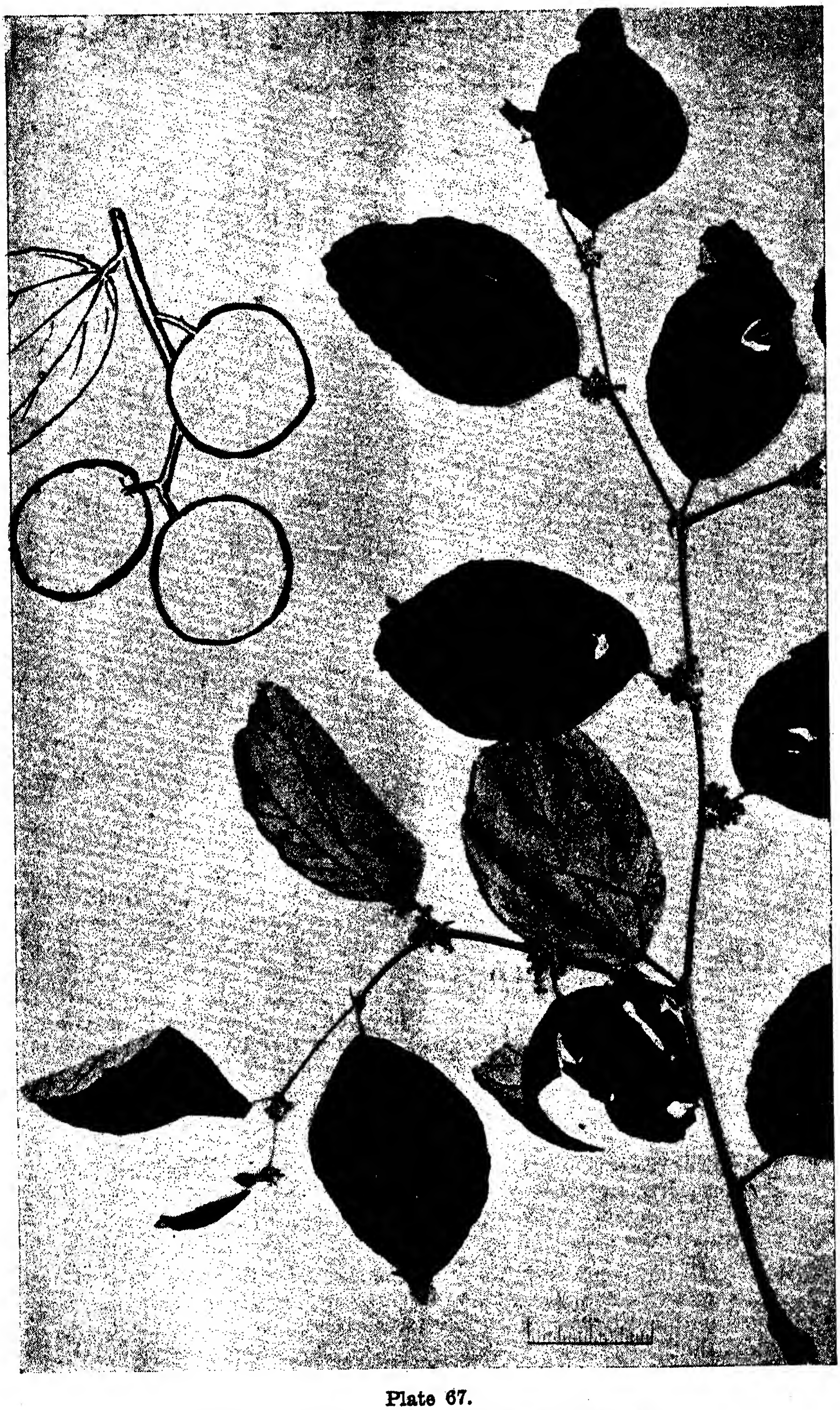


Plate 67.
INDIAN JUJUBE OR CHINI (*Zizyphus mauritiana*).

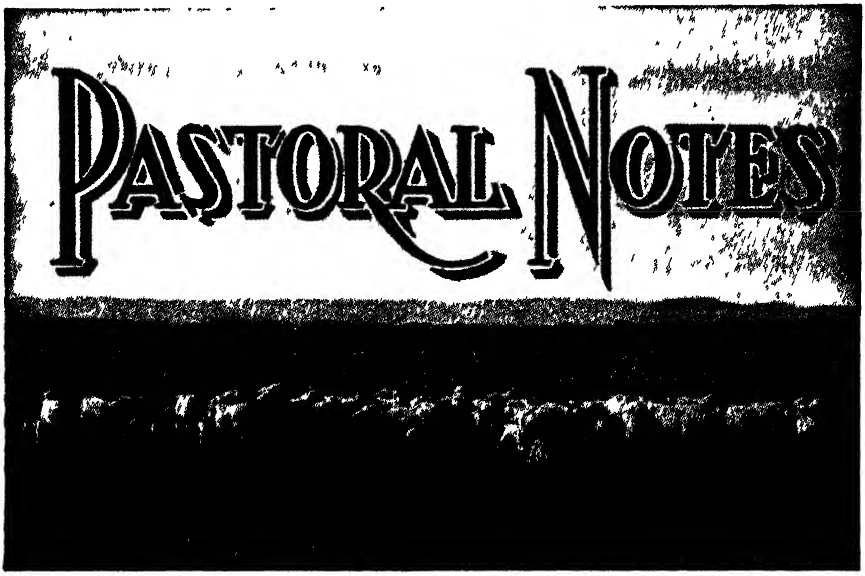
fruit is usually globular, or it may be oval, and varies from between ¾-1½ inch in diameter. The colour when ripe is yellowish or reddish. In the centre is a seed like a cherry stone, and the surrounding flesh is in taste and consistency similar to one of the drier sorts of apple. When at the correct degree of ripeness, it is quite palatable raw, and is good stewed, as jam, or in pies. However, due no doubt to the contempt usually accorded to a wild plant, it is not much eaten except by children.

"It does not seem to really warrant the description of a menace. Firstly, it has been growing in certain districts admittedly for very many years, and it is highly improbable that any effort has ever been made to eradicate chance plants; even so, although common, it has not spread to an alarming extent. It does not form a dense thicket like the Lantana, for instance; and is no more difficult to eradicate, except for the spines, than the average small tree or bush. In the case of occupied lands, it should not give any trouble; along water courses it may even serve a useful purpose in holding up the banks. It does not appear to be connected with fruit fly propagation; scores of examinations of fruit have been made for presence of fruit fly larvæ, but in not one case has any been found; while no flies have ever emerged from ripe fruits collected from different localities and held in glass jars."

It would seem from Mr. Hancock's report that people who are growing the Indian Jujube should make special efforts to see the tree does not get out of bounds. Many thorny trees of this type can become pests if a careful check is not kept on them.

Plate 68.

FROM THE ROAD TO THE FURROW.—A North Coast farmer, becoming "tractor-minded," converted an old car to this effective power unit, which now straddles the furrow instead of straddling the rut, and does its job well.



Calving Troubles.

CASES of difficult calving are fairly common, and before the usual calving time arrives, a few hints may be useful.

When about to calve, the cow leaves the herd and seeks a quiet spot. There she will become restless - getting up and lying down—and show evident signs of pain.

As labour advances the back is arched, the hindquarters are drooped, and straining becomes violent and continuous. Meanwhile blood may appear on the vulva and tail, and the waterbags protrude between the lips of the vulva. They increase rapidly and the feet of the calf may be seen within them.

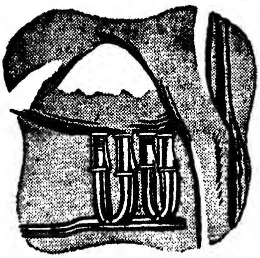
The waterbags furnish a soft, uniform pressure for the preliminary distention of the womb and passages, and prepare the way for the delivery of the calf. In normal presentations, it is wrong to break these bags prematurely.

When the cow calves standing up, the navel string breaks when the calf falls to the ground; but, when she calves lying down, the string is broken when she rises. A few hours after calving normally, afterpains commence and the placenta or afterbirth is expelled. If this is not expelled within twenty-four hours, it should be removed by careful traction. A good method is to take two sticks about 2 feet long, between which the end of the afterbirth is grasped, and rotated around them until close to the vulva, when gentle traction is applied, from side to side, and backwards and downwards, care being taken not to break it. A vaginal douche of boiled water at blood heat, to which has been added a mild antiseptic, should be given. A cheap and efficient outfit for this purpose consists of about 4 feet of ½-inch rubber hose and an ordinary funnel. The end of the hose should have its edge pared off with a sharp knife, and, after having been smeared with carbolic vaseline, it is introduced into the vagina, and gently pressed forward as far as the womb. The funnel is then placed in the other end of the hose and held above the cow's back, the douche being poured into it.

It is well, at all times, to allow nature to do its work without interference; but, when calving is protracted, and progress is not being made, a careful examination is necessary.

The operator should wear a clean sleeveless shirt, and his arm should be smeared with carbolised vaseline, or an antiseptic oil. This protects the arm from poisoning and the cow from the introduction of infective material into the passage.

The hand should now be introduced into the vagina and a careful examination made. It may be found that (1) the waterbags have burst, and that neither the



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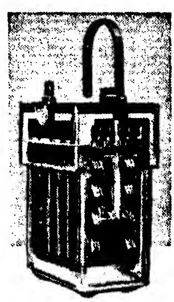

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feet nor head of the calf are presented, or that there is a presentation of (2) one fore foot and head; (3) both fore feet, and head back; (4) head with both fore feet back; (5) one hind foot without the other; or (6) other abnormal presentation.

Whatever part is presented should first be secured by a rope with running noose, so that it will not be lost during subsequent manipulation, and may be readily brought into position when the missing parts are found. If the cow is standing, her head should be turned downhill so that the fœtus and abdominal organs lie forward to give more room to bring up the missing head or limb. If lying down, she should be turned over on to the side opposite to that on which the limb is missing. When the missing part is located, no attempt should be made to bring it up during a labour pain, but after the pain has ceased, an effort should be made to secure it before the next pain comes on.

If the pains are continuous and violent, they may be checked by putting a tight surcingle round the body in front of the udder. If it is found that the passages are dry, pure olive oil may be run into the womb through a rubber tube. If the head is back, the limbs which are presented should be first secured with a rope having a running noose, then the fœtus should be pushed as far back as possible and an attempt made to secure the head with a noose or hook, and to bring it up into the passage. Having brought the limbs and head into suitable position, traction should now be applied in a downward and backward direction, but only when the cow is straining.

Pulling when the cow is not straining should not be attempted. Patience and care are necessary. The extraordinary practice of attaching a draught horse or motor-car to the fœtus and pulling it out by sheer force is not only cruel, but usually results in the death of both the cow and the calf. After a protracted calving the cow will be exhausted, and she should be provided with a warm rug and bed, also a few bottles of warm gruel.

Points to remember are:—

Do not interfere too soon.

When interference is necessary, exercise patience and take time.

Do not use force until the fore feet and head or the hind feet are secured in position.

Remember to pull only when the cow is straining.

GETTING READY FOR SHEARING.

Long before the shearing season starts graziers would be well advised to give that necessary attention to the shed, plant, and yards.

Starting is often delayed because everything has been left to the last minute. The shed itself should be clean, and all pen gates and hinges seen to to ensure convenient working. Grating floors, also, should be attended to where necessary.

The down shoots should be carefully repaired, if necessary, thus ensuring that shorn sheep are not ripped by outjutting nails, splinters, or other projections. Counting-out pens nearly always need repairing. The branding race and the gates at both ends should be in good working order.

Inside the shed all machinery should be overhauled, belts examined, hand-pieces attended to, and oil cans ready.

The wool bins may need a nail or two, new rungs may be required in the wool-rolling, piece-picking, and classing tables.

The wool press should be overhauled thoroughly and the ropes examined, for if new ropes are necessary rigging them is a long job.

Have wool packs placed conveniently near the press and all tools used in pressing in their places. Scales should be tested and every other detail attended to. If this work is neglected until the commencement of shearing, delays and frayed tempers are inevitable.

MERINO STUDS IN QUEENSLAND.

From time to time it has been argued that Queensland cannot produce merino stud sheep comparable with those of other States. Fortunately, there are men in the State who, with foresight, ability, and capital, have, in a practical way, proved the opposite.

No branch of the sheep and wool industry in Queensland has shown more rapid progress than stud breeding. To Victoria Downs must go the credit for the initial effort. From the inception of that stud, the sheep produced have more than held their own with Southern importations.

Lansdowne imported into this State the highest-priced ram sold at the Sydney sales a year or so ago. There, excellent work also is being done.

Dunstan provides for those who believe in the policy of strength for the Western country, and at Charleville took the championship of Queensland with a ram of this type.

For some years past the Strathdarr stud has progressed remarkably, and at Central-Western shows the list of awards gained by sheep from this stud must give much satisfaction to the breeders.

Coreena in the same district breeds wool of splendid quality, and more than maintains a general excellency.

Malvern Hills continues to improve, and a fair proportion of the awards go to this stud wherever sheep are shown.

Terrick produces quality sheep eminently suited to the climate and conditions for which they are bred, and the general improvement in this stud is remarkable.

At The Womals are produced probably the strongest merinos in Queensland—fine, big, upstanding sheep with plenty of constitution and fitted to withstand droughty conditions in the Far West.

Craigielea sheep, too, are of great size, with a very nice handling wool, medium to strong.

Weribone stud also has done, and continues to do, great service to the Queensland pastoral industry.

The object of this brief note is not to mention all the merino studs in Queensland, and those named are selected because of the fact that they show regularly, and their sheep are therefore constantly before the public. Smaller studs are starting, and with the wise selection of sires and constant, thorough culling of the ewes will, no doubt, in course of time, achieve the success for which they are working. The successful establishment of these studs in Queensland has an effect on the industry which it is difficult to estimate in money figures.

BONE-CHEWING.

No animal can thrive unless its food contains a sufficiency of certain elements, including the minerals phosphorus and calcium. The requirements of the different farm animals are, however, not the same. Normally, enough phosphorus to maintain the health of cattle is contained in the pasturage, but for various reasons—e.g., phosphorus-deficient soils, and a succession of years in which the rainfall is scanty—a deficiency in this element arises in the natural feed.

An early symptom of phosphorus deficiency is a marked desire shown by affected animals to eat bones and offal. This condition is fairly common in parts of Queensland. Animals develop dropsical swellings, stiffness in gait, and symptoms similar to those of rickets in children. Young cows about the time of first and second calf, milking cows, and cows heavy in calf make heavy demands on the available phosphorus and are therefore very susceptible. Dry cows and older stock are less liable to suffer. Stock suffering from a shortage of phosphorus will chew bones, pieces of wood, bark, earth, and other substances.

Treatment, except in extreme cases, is followed by good results. On the smaller holdings where animals are watered at troughs, the addition of six drams of phosphoric acid to each 10 gallons water, supplemented by a ration of bran and chaff, gives very satisfactory results. Under station conditions, a lick containing sterilised bone meal two parts and coarse salt one part—a proportion of 2 to 1—with the addition of molasses to increase palatability, should be made available to the animals.

SEASONAL CONDITIONS AND SHEEP PARASITES.

Seasonal conditions should be considered when attempting to protect sheep against likely losses from blowfly strike.

If spring rains occur, resultant warm, moist conditions may be conducive to a big increase in flies. Fresh green vegetation, springing up after rain, is likely to cause scouring in flocks in localities in which those conditions prevail. Graziers who benefit by spring rains may, therefore, expect trouble amongst their sheep with wool sufficiently long and probably dirty.

To treat the old sheep in a flock is only putting off the evil day, and much greater benefit will follow the effective treatment of the whole mob. Shearing is a great protection, but as this is only an annual job, the long interval between shearings must be considered. In places where dipping for lice and ticks is necessary, it has—if a good arsenical mixture is used—a most protective effect on the sheep, besides killing many of the flies. Dipping, from this point of view, is most satisfactory when the sheep are carrying at least six weeks' growth of wool. Crutching is a sanitary and useful method likely to give some protection against fly strike, but, as it does not kill the pest, the protection will be of short duration in a bad fly season.

Jetting with a regulation .8 per cent. arsenical mixture will not only protect the sheep from maggots, but also will destroy large numbers of flies which suck the poisonous moisture from the wool. Because of the strength of the mixture, the wool surrounding the usual places of attack will carry arsenic in sufficient quantity for some weeks to kill any maggots which may be deposited after jetting. Jetting does not prevent strike, but will destroy the maggots before they do harm to the sheep. The important point is for the flock owner, where early storms are experienced, to apply his favoured method of protection to all his sheep as soon as convenient.

The same seasonal conditions are also conducive to an increase in internal parasites. The worms which usually cause trouble in a flock become numerous while the sheep are still doing well on fresh green feed. Consequently, the risk of pasture contamination is serious. When the grass becomes dry and less nutritious as the season advances, the wormy sheep will suffer severely, while heavy lamb losses may be expected. Early drenching for the control of stomach worms will do much to protect the sheep. Where necessary, drenching should be continued at monthly intervals.

VEALER CALVES.

Provided a calf is kept on the mother to allow it to reach a live weight of about 80 lb., a satisfactory return is assured when marketed. Large numbers of calves are being slaughtered annually for export as boneless veal, and the trade has reached such proportions that buyers are usually operating in all dairying districts. It is well worth while to keep the calf for a while before selling for slaughter. A calf responds quickly to a few days' suckling, and this can quite easily mean the difference between an underweight and overweight calf—a matter of at least 5s. in its value.

A CATTLE CRUSH ON EVERY FARM.

A crush for holding cattle or horses should be built on every farm. It costs little and occupies a small area; yet it saves much time and labour when full-grown stock are to be dehorned, branded, castrated, speyed, drenched, or otherwise treated. For these operations, the animal should be held in a position which allows of no movement.

The ordinary crush can be arranged to accommodate large or small animals. A series of auger holes (½ in. diameter) are bored about 6 inches apart along two rails of convenient height on each side of the crush. The holes should be deep enough to seat a bolt or iron pin firmly. The bolt or pin should stand 4 to 6 inches above the rail. These pins—one on each side—serve as chocks against which a cross rail may be placed. By working the animal right to the front of the crush, the pins and rails may be arranged to prevent any "backing." In a similar way the width of the crush may be adjusted to prevent lateral movement.

To secure the head of the animal, the "A" shaped bail-type of structure may be made from a double cross rail between which slide vertical poles attached to the base of the crush posts by stout hinges. With such a crush, many farm operations usually requiring four men can be done quickly and efficiently by a man and boy.

GRAIN SORGHUM FOR SHEEP.

Sheep are thorough masticators, so whole sorghum grain may be fed to them without fear of serious waste. Provided the sheep are able to get enough roughage—so that rumination is not impaired—whole grain is returned to the mouth, and so becomes well ground in the process of mastication.

The smallness of the grain enables it to be intimately mixed with most feeds, so there is little danger of selective feeding. This is of importance in the drought feeding of the merino.

The harder grains may present some difficulty to lambs. In such cases, grinding of the grain is recommended. Where grinding is impracticable, the grain may be soaked. If soaking is decided upon, it should be done while the grain is still in the bag. Half bags are most convenient to handle. A routine by which one lot is draining and the next lot is soaking should be arranged. Each time a drained lot is removed for feeding it may be replaced by the next lot in soak, which, in turn, is replaced with a fresh lot for soaking. This process ensures clean, soft grain for feeding to the animals.

MERINO TYPES FOR DIFFERENT DISTRICTS.

The old argument as to the best type of merino wool to breed is frequently heard amongst sheepmen. Advocates of the fine wools are usually most emphatic, likewise those who hold a brief for the strong and medium. As a matter of fact, there is a useful place for all three types, but it is a fatal error to try and breed a type on country unsuited to it. Thus in the far west, north-west and central areas, where sheep have certain hardships to withstand, and there are periodical droughts, the fine-woolled merino is not considered suitable. Remembering that to a very large extent constitution goes with strength of fibre, a strong-woolled merino does best in those regions.

Nearer in, in the south-west and Maranoa districts particularly, a strict medium may be found most profitable, but it should be recollected that to maintain this medium, rams slightly stronger than the desired type should be used. On the Darling Downs, Stanthorpe, and Border areas a fine wool may be grown with profit. Thus fine, medium, and strong all have their uses and habitats.

POLLED CATTLE.

In any programme of breeding or of grading up existing herds, the introduction of polled stock should be regarded as a necessity. Shorthorns and Herefords represent the bulk of the beef cattle in Queensland. The polled Shorthorns and Herefords are a comparatively recent development and the percentage of polled stock which will result from crossing with horned breeds is uncertain.

With the so-called "natural polls," the power to transmit this characteristic is marked. It is most noticeable in the Galloway breed, but this type is not largely represented in Australia.

Red polled bulls crossed with horned breeds or their crosses may produce a large percentage of hornless stock, but the prepotency of Aberdeen Angus bulls with respect to colour, conformation, and hornlessness is superior. From 80 to 90 per cent. of the calves obtained when Aberdeen Angus bulls are mated with horned stock of mixed breeding are black in colour and most of them are hornless.

FEEDING FARM HORSES.

It is not unusual to see a farm-hand pitchfork hay into a yard over which manure is thickly scattered. This is a source of loss and risk. Much of the hay is trampled into the dust or mud and rendered unusable. Even ensilage may be wasted in this way. A far greater, although more indirect loss to the stockowner, is caused by the contaminated feed. Many farm horses are infested with worms of various kinds, and dirty yards may teem with the parasites in their initial stages. These get into hay, or other feed tossed on to the ground, and are swallowed by stock, often with disastrous results. Deaths among farm horses have been traced to worm infestation, and owners will find it worth while to take great care in feeding their working animals. A rack or a trough ensures greater cleanliness and saves waste of good feed.

Care of Milking Machines.

MILKING machines, although they have revolutionised dairying methods, may, if mishandled or neglected, constitute a real menace to milk and cream quality. Some people hold the opinion that clean milk of good keeping quality and choice grade cream cannot be produced with a machine, but this has been investigated fully and both research work and practical experience have proved that it is wrong. As good a quality of milk can be produced by machine as by hand, provided the correct procedure is followed in care and cleaning.

Another objection often brought forward is that the machine tends to increase udder trouble. This is, of course, true if the farmer fails to notice cases of infection as soon as they occur and allows diseased cows to be milked by the machine. The great importance of inspecting the foremilk for any abnormal appearance should be realised, and any cow showing signs of mastitis in the first-drawn streams should be milked out by hand and the milk isolated from that used for human consumption. Cows with sore teats should also be milked by hand, although the machine may safely be used if they are left until last. A machine is very unlikely to cause teat sores—in fact, one Queensland dairy farmer with a large herd has experienced complete freedom from them over six months since he started machine milking—but it is liable to transfer the infection if used subsequently, without sterilization, on other cows.

The solution of most milking machine troubles lies in proper cleaning and sterilizing after each milking. It is essential that cleaning should be done promptly after milking is completed before the milk solids have time to dry on the rubber parts, for once dry they are far more difficult to remove completely. The first machines were crude inventions made with ordinary rubber parts, which were easily cracked and pitted by the action of fat and hot water, making them excellent breeding places for contaminating bacteria. Nowadays, the modern machines are solidly built and the rubbers are of the very best quality resistant to high temperatures, so that they can safely be boiled and even sterilized regularly by steam, without injury.

The method of dealing with milking machines using a weak solution of caustic soda in boiling water is well adapted to Australian conditions, and has proved economical, rapid, and successful. This method is as follows:—

(1) One gallon of clean *cold* water is drawn through each set of teat cups by suction, lifting the unit up and down in a bucket of water to allow air to mix with it.

(2) The outsides of teat cups and rubber tubing are then washed and brushed in *warm* water and caustic soda.

(3) At least one gallon of *boiling* caustic soda solution is drawn through each separate set of teat cups, holding them so that all receive equal treatment.

(4) The solution is removed completely by drawing at least 2 gallons of *boiling* water through each set of cups.

(5) If steam is available this is applied for five minutes to complete the sterilization.

Strength of Solution.—One full teaspoonful of caustic soda added to every 4 gallons of boiling water is the correct amount and, provided this strength is not exceeded, no damage will be done to the machine and satisfactory results will be obtained. Used carelessly, however, caustic soda is dangerous in its action, and care is needed in handling it and in making up the solution. The water used must be really boiling to achieve proper cleansing and sterilization, and by this treatment the resistance of the rubber parts to cracking is actually increased.

The vacuum line is often a source of trouble and should receive a complete flushing once each day with boiling water, care being taken not to flood the pump. All taps should be left open when the machine is not in use and the teat cups should be hung up in a cool, dust-free place. The use of chemicals, other than in the washing process, has been found to be unsatisfactory, and there is great danger of traces of them finding their way into the milk and cream and causing taints.

A COMMON CREAM TAINT.

One of the more common defects in cream is that which is referred to as "disinfectant flavour."

The cause of this taint, in most cases, is carelessness in the handling of disinfectants before and during milking. The use of dilute solutions of some disinfectants—other than Condy's fluid—for bathing cows' udders and teats before milking also can give a taint to the milk. The cleansing of milking machines and utensils with disinfectants, possessing strong odours, is another cause of this taint, which is imparted to the cream, either by absorption of the vapours or direct contact. No amount of aeration or stirring will remove the taint from the milk or cream. For this reason, disinfectant-tainted cream cannot be used with safety, even in the manufacture of pastry butter. Consequently, it is rejected at the butter factory as being unfit for human consumption.

To avoid the risk of taint the following suggestions are offered:—

1. Don't use disinfectants with marked odours.
2. Sore teats should be treated with petroleum jelly, or some odourless ointment.
3. Use a solution of washing soda—from 3 to 5 per cent., say—for cleansing dairy utensils. It removes grease readily and corrects acidity.

MILK FROM THE NEWLY-CALVED COW.

The milk of the newly-calved cow is abnormal and is called colostrum or beastings. It is yellow in colour, has a rather strong pungent taste, an unpleasant odour, a sickly albuminous flavour, a high specific gravity, a high total of solids, high albumin, and low figures for fat and sugar. The fat of colostrum has different properties from that of normal milk, and the sugar is largely glucose and not lactose—it also shows a larger proportion of phosphate.

Colostrum milk serves only as food for the new-born calf, and not as a means of increasing the supply to the factory. Besides serving as food for the calf, it increases the resistance of the calf to disease during the first few days of its existence. The milk approaches normal day by day until, in seven days after calving, it is practically normal, although it may take up to a fortnight to attain perfect normal composition.

It is advisable to isolate the newly-calved cows, and for the first seven days at least this colostrum milk should not be mixed with normal milk, either for butter or cheese making. Cream from such milk blended with good cream results either in the whole delivery being graded down to second grade, or in its being completely rejected. For that reason, this milk should not be separated at all. Colostrum milk is quite unfit for cheese-making, since it is easily coagulated by heat, curdles very slowly with acids and rennet, and results in very poor quality cheese.

It should be remembered, therefore, that—(1) colostrum milk is food for young calves only; (2) it should on no account be sent to cheese factories or, as cream, to butter factories.

MILK FEVER AND HOW TO TREAT IT.

Since the discovery of udder inflation for the treatment of milk fever, this disease has had few worries for the dairy farmer, but it is considered that a few notes on it, describing the precautions to be observed in udder inflation, some of the undesirable consequences that may follow, and recent advances in treatment may be useful.

Usually the condition has been present some time before treatment is applied, and the affected beast will be down and more or less unconscious.

The udder should be wiped well with a clean, damp rag, and then a clean towel should be placed under the udder to prevent contamination from the soil. The beast should then be propped up on its breast bone in as natural a position as possible, taking care that the hind legs are in a normal position and not causing undue pressure on the udder. In very advanced cases this may not always be possible, but it should be attempted.

Strip the udder of any milk present and then commence inflation with a teat syphon. Each quarter is inflated firmly and the teats are tied off at the bottom with clean tapes to prevent the escape of air. The udder should then be massaged gently to distribute the air throughout the organ. The tapes should be untied about an hour after they were put on. If no improvement is noted after three hours, inflation should be repeated. The most undesirable after-effect that may follow treatment by udder inflation is mammatis. To avoid this the following precautions should be observed:—

1. The teat syphon used should be sterilised thoroughly before use by boiling.
2. Take every precaution during inflation that the teat syphon does not come in contact with any contamination; should that happen, immerse the syphon in boiling water before continuing its use.

   These precautions are against the possibility of introducing any infection into the healthy udder.
3. If a quarter of the udder of a cow being treated with milk fever is affected with mammitis, or has been so affected at any time, that quarter should be the last inflated; and, following use on that quarter, the teat syphon must be sterilised thoroughly by boiling before being used again.

   The necessity for such a precaution is obvious.

Despite the fact that most cows treated for milk fever by udder inflation record an uneventful recovery, it has been found that better results are obtained by the subcutaneous (under the skin) injections of a substance known as calcium boro gluconate. It is well known that in milk fever the calcium content of the blood drops considerably, and the injection of calcium boro gluconate aims at restoring the lost calcium balance. In addition to being a more convenient treatment, other advantages it possesses over udder inflation are that there is no risk of introducing or spreading mammitis, recovery is more rapid, relapses are less likely to occur, and also the method may be used as a preventive. The drug is put up in convenient form commercially, and the local chemist will be able to advise where to get it.

The drug is usually issued in cartons containing 2½ oz., the contents are dissolved in 10 oz. of hot water recently boiled and then allowed to cool to body temperature before use.

The dose given is sufficient for one treatment, and should be injected under the skin at various parts of the body—do not inject all the solution in one place. The usual precautions are taken regarding sterilisation of the syringe and needles and antiseptic precautions at injection.

It has been found that repetition of the dose is rarely necessary.

Some cows are known to be more subject to milk fever than others, and in such cases it has been found advisable to give an injection immediately after calving, followed by a second injection about twenty hours later. For these injections the dose should be half that used for curative treatment.

Whatever the method of treatment adopted, it is advisable to cover the animal with a rug, and in no circumstances should the beast be drenched, as because of the paralysis extending to the throat the cow is unable to swallow, and any liquid forcibly given many enter the lungs and set up pneumonia, which almost invariably proves fatal.

When the treated cow gets to her feet, it is advisable that some form of after treatment should be adopted. The udder should not be touched for at least twelve hours after the cow has risen, and milking "dry" must be avoided. Small quantities of milk should be drawn off at frequent intervals on the following day, and the diet should be restricted.

QUALITY IN MILK AND CREAM.

During summer it is necessary for dairy farmers to take greater care in milk and cream production if defects in milk or cream are to be avoided.

Milk is an ideal food for bacteria—microbes or germs as they are popularly called—which thrive on milk and soon spoil it, with the result that not only the milk but its derivatives are de-graded in quality. Spring and summer temperatures in Queensland are conducive to the rapid multiplication of most bacteria, and the summer heat especially favours organisms which impart objectionable taints to milk and cream.

The prevention of faults in milk and cream is almost entirely dependent on the methods of production. It may be claimed that clean milk production calls for much greater effort and correspondingly increased costs for which there are no compensating returns. This is not so. Milk of a very low bacteria count may be produced with little, if any, additional work or time in ordinary hygienic surroundings, and with inexpensive equipment. On the other hand—although not usually—dirty milk may be produced in elaborate buildings and with faultless equipment. Success in clean milk production, like most other activities, depends largely on the will of the persons engaged in it. If those responsible exercise cleanliness and care in every operation from the moment the milk leaves the udder until the delivery of cream at the factory, undesirable fermentation caused by the entry and multiplication of harmful bacteria will be largely prevented, because the normal lactic acid-producing bacteria are more likely to gain control and suppress the growth of the objectionble types. With milk for cheese-making an attempt should be made to check the development of too much acid by keeping the evening's milk as cool as possible while it is being held overnight on the farm. Passing the milk over a tubular metal cooler through which water is circulating is the method for rapidly cooling milk easily adapted to ordinary farm conditions.

The chief factors governing the production of choice quality milk and cream are set out briefly below:—

1. Clean flanks and udders with a cloth moistened in water in which there is a weak solution of Condy's fluid.
2. Wash the hands before and as often as necessary during milking.
3. Thoroughly clean and sterilise utensils after use in the following manner:—
   (*a*) Rinse with cold or luke-warm water.
   (*b*) Wash in hot water in which washing soda is dissolved, using a scrubbing brush for the purpose.
   (*c*) Immerse in, or scald with, boiling water.
4. Allow utensils to drain and dry in an inverted position on a dust-free rack. Do not use a cloth to dry them.
5. Cool milk and cream immediately after milking, and maintain as cool as possible until delivery.
6. Exercise care in sterilising utensils at all times, and more than usual care in summer, when temperatures are more favourable for bacterial multiplication.

DAIRY FARM FACTORS.

There are certain essential factors in dairy farm management that make all the difference between success and failure. Although milking may be regarded as the main job on a modern dairying property, it is really the culmination of herd management, breeding, feeding, and attention to detail.

Why is it that on two identical farms, with only a boundary fence between them, production will show a vast variation? The answer is found in the fact that on one property, constant attention is given to all the operations—from calf rearing to the final disposal of the milk or cream—while on the other farm, careless or bad management in one or two operations mars the whole effort.

It is useless to lay down good pastures and provide food, shade, shelter, and water for stock, and then keep on breeding from low type producers.

Another important matter which should not be overlooked is the fact that modern intensive methods of dairy farming place a very high strain on the constitution of the dairy cow, and much of this constitution may be ruined by faulty methods in calf-rearing. From a practical viewpoint it is better to feed the breed than to feed the weed.

PROFITABLE DAIRYING.

Some farmers consider that the more cows they milk, the more efficient and profitable their dairying practice becomes. But when success in dairying is mentioned, many other factors must come into the reckoning.

Pasture management, milk and cream quality, and stock diseases can all be controlled by the farmer. Good pasture management requires the introduction of the best grasses, rotational grazing, the conservation of fodder, pasture renovation, and the use of any necessary fertilizers.

The quality of milk and cream is controlled largely by the attention given to milking, separating, storage on the farm, freedom of the pastures from milk-tainting weeds, and the health of the herd. The incidence of disease in the dairy herd, of course, depends largely on the care and attention given to the animals.

The milking capacity of the herd depends obviously on the milking capacity of the individual cows. The question as to which are the best producers can be determined by systematic herd testing. Unprofitable cows should be culled as soon as practicable. Only the best cows should be kept as breeders. Boiled down, the yield of butter-fat to the acre determines the soundness of dairy farm management.

Good farm management and a poor herd are just as bad as a good herd and poor management. Good management and a good herd together must result in a high yield per acre.

CREAM COOLING.

If properly used under conditions of scrupulous cleanliness, a cream cooler will give excellent results. Besides lowering the temperature of the cream and thus checking bacterial development, a cooler aerates the cream, releases gases and food flavours, and improves its consistency. Freshly separated cream, after it has been cooled sufficiently, should be mixed with the cream already held in the dairy. Fresh and over-ripe cream should not be mixed, as is often done when lots are held in separate vessels until delivery day. Cream should be stirred frequently while it is held on the farm. Proper stirring controls the ripening.

STERILITY IN DAIRY COWS.

In each year, with careful management, the proportion of calves dropped should approach 100 per cent; but on many dairy farms, perhaps, the number of calves dropped ordinarily would not approximate 80 per cent. Hence, about one-fifth of the progeny is lost.

Apart from disease, the most common causes of sterility are protracted periods of semi-starvation, and the other extreme of over-feeding. The latter cause usually occurs among cattle prepared for the show ring. But with show cattle the trouble may be overcome by making the animals work hard for their living by turning them into a paddock where feed is short, and where they have to walk long distances to grass and water.

When starvation is the cause, the remedy is obvious. Failure to make provision for the hard times which always come along leads to loss through cows not breeding regularly, involving the loss of the calf, the production of the cow, and often the cow herself.

The provision of stacks of hay or silage in favourable seasons, and keeping them in reserve until required, may make all the difference between profit and loss.

The breeding animal should be of adult age, neither under nor over-fed, and should have moderate exercise.

The common practice of allowing the bull to run with the cows is not commendable. With the bull kept under control he is able to serve many more cows, and the time of cows coming in may be so arranged that they will calve when feed should be available in normal seasons, and when butter-fat is not usually at its lower price.

Size of Breeding Sows.

SIZE is an important feature in breeding pigs, yet some breeders do not give it sufficient consideration.

One of the chief objectives in pig raising is to get pigs to marketable weights in the shortest possible time. To obtain the desired rapid development and still have a finished pig with a light covering of fat, it is necessary to breed from pigs which are big within their class. That is to say, pork type breeding stock—such as Middle Whites—should be big animals of their category if their progeny are to grow quickly to porker weights. Bacon type breeding stock—such as Large Whites—also should be big of their type if their progeny are to develop similarly to baconer weights. The extreme bacon type of breeding stock could, of course, be used to produce fast-growing porkers, but such porkers, under normal feeding conditions, would not be sufficiently mature to give good carcases at porker weights. Breeding pigs should be big within their type.

Size is inherited in pigs as it is in horses, and trying to grow a small type pig into an extreme bacon type is like trying to make a pony into a draught horse.

Observations lead to the belief that size within a breed is frequently lost through mating stock before they are sufficiently grown.

A large breeding sow, provided she is not too fat and clumsy, is more likely to produce a litter of large pigs and to be able to suckle them better than a smaller sow under similar conditions.

Records of a large number of breeding sows show that sows which are mated when between nine and twelve months old are more productive throughout their breeding career than sows mated earlier or later.

Under Queensland conditions, it is common to see sows mated at five to six months old when they are barely bacon weight, but this practice does not give the sows a chance to develop and become productive mothers.

The best recommendation is to mate sows when they are about nine months old, or when they have reached a live weight of approximately 250 lb. In cases where sows are mated when very young, either by accident or design, they might be given a chance to develop by withholding them from service for some weeks after their first litter has been weaned.

HOW TO KEEP PIGS HEALTHY.

By the general practice of hygiene and sanitation in the piggery, coupled with sound feeding methods, the incidence of most pig diseases can be considerably reduced.

Roomy, well-ventilated, but draught-proof sties are necessary.

The floors should be swept clean every morning, all refuse being taken away, and the yards raked over. Correct drainage of sties and yards will avoid the accumulation of water and help to keep down insanitary conditions.

Moisture is necessary for the free living stages of nearly all worm parasites; in its absence very few of them can survive for any length of time. Therefore, pig keepers who wish to avoid losses from worms must have dry, well-drained sties and yards.

Unhygienic and insanitary conditions are predisposing causes of rheumatism, catarrh, and some of the more serious bacterial infections—such as suppurative otitis and pneumonia. Piggeries should therefore be constructed on high ground, floors should be made of concrete, and the run should be well sheltered from inclement weather.

Correct feeding and watering, together with adequate housing and paddocking, are undoubtedly most important factors in the preservation of the health of the pig.

PIG BRANDING.

Under the Queensland Pig Industry Act the identification of all pigs sold, offered for sale, barter, or exchange is compulsory. This is essential to satisfactory marketing of this class of stock, and where marking is done as a regular routine job it presents little difficulty. Identification facilitates investigation into disease, whether epidemic or otherwise.

The Act provides particularly for the marking of all pigs consigned to factories, and there has been widespread appreciation of its value. There may be differences of opinion in regard to the advantages of various systems of identification; but, from a factory point of view, it is a very great advantage to have the carcases plainly identified.

Exporters prefer the body tattoo as a means of identification, and bacon-curers almost without exception are more than satisfied if the carcases are tattooed efficiently. The use of the firebrand is being superseded generally by the more efficient method of tattooing, in which a body-tattooing instrument and marking paste or ink are used.

The marking of sucker, weaner, and store pigs presents greater difficulty, because neither the body tattoo nor the firebrand are sufficiently permanent where the pigs are to be retained on the farm for periods varying from two to five months. In the case of these young pigs two systems are especially adaptable—viz., earmarking and ear-tattooing—the latter being suitable only in the case of white or red coloured pigs.

The departmental pamphlet, "Identification of Pigs," is available free on application to the Department of Agriculture and Stock, Brisbane.

PIG RINGING.

To save unnecessary exertion and to avoid the risk of being bitten when ringing a pig, a twitch like that used when drenching a horse is useful.

Small pigs may be held while the twitch is fitted, but larger pigs should be forced into a crate or race where they cannot turn or back. The rope loop of the twitch is slipped into the pig's mouth and pulled round the upper jaw just past the end of the snout. Twist the handle quickly until the loop is tight, and the pig should stand quietly. The handle should be held firmly while the operator puts the ring in place, then untwist the rope and allow it to fall clear of the pig's mouth, retaining a hold on the handle.

Pigs of all sizes may be held firmly by this method, and apart from the convenience of handling the job may be performed quicker.

The use of a twitch is also advisable when tusks are being removed from boars.

CARCASE YIELD.

The loss of weight in transit of a pig from farm to factory, and then during dressing, varies greatly, and it is not possible to say exactly what weight a pig will lose.

Factors which affect the amount of loss are: The size of the pig (the larger pig will lose a lower percentage); the manner in which the pig had been fed; the distance of the journey from farm to factory; the conformation and condition of the pig; and the amount of food contained in its alimentary tract when it is weighed alive.

In tests it has been shown that under conditions similar to those ordinarily ruling in Queensland, pigs weighing 150 lb. to 200 lb. alive on the farm lose about 10 per cent. of this weight in transit to the factory, and then another 20 per cent. in dressing. Lighter pigs, weighing 100 lb. to 140 lb. alive, usually lose approximately 33 per cent. by the time they are dressed. Whilst these figures possibly are a fair average, individual pigs vary considerably according to the factors already mentioned.

As a rough guide in estimating dressed weight from live weight, farmers usually take seven-tenths of the live weight for baconers and two-thirds of the live weight for porkers.

POINTS FOR THE PIG BUYER.

It is not every day that we buy a pig, so it is worth while remembering a few points when considering the purchase of stores. Having decided the class and type of animals required, the next thing to do is to inspect the pigs on offer. Move them around and inspect each one individually, observing defects like rupture, rough, coarse skin and hair, and estimating what is the real and not the apparent average weight.

A point that cannot be overstressed is that if a pig sale is attended for the purpose of purchasing stores, and there is nothing really suitable on offer, or the prices are too high, it would be wise from a financial point of view to forget all about them.

Far too many people just buy because that was their original intention, forgetting the point as to whether the pigs put up for auction are worth a higher bid.

It is important to know the highest figure that should be bid, and the one which will turn out to be economically sound when the pigs are fattened up to pork or bacon weights. The class and age of the animals, of course, must be considered, but it is just as well to make sure that there is a reasonable margin of profit in prospect when the pigs go eventually to the butcher or the bacon curer. Only a simple calculation is needed, and the error, if any, should be on the low side, for optimism may turn out to be monetarily disastrous.

It is impossible to get away from the fact that some people are born salesmen or born buyers, but the qualities of both can be cultivated. It is a good thing to know just when to "get in" or "get out," but that knowledge must go hand in hand with sound practical farm management. A note of warning: Cheap pigs in low condition are no good to any man, and must eventually cause a heavy instead of a light expenditure.

ON THE SCALES—PIG WEIGHTS.

The loss of weight in transit of a pig from farm to factory and then during dressing varies very much, and it is not possible to say exactly what weight a pig will lose.

Factors which affect the amount of loss are: The size of the pig—the larger pig will lose a lower percentage—how the pig has been fed, the length of the journey from farm to factory, the conformation and condition of the pig and the amount of food contained in its alimentary tract when it is weighed alive.

In tests it has been shown that under conditions similar to those ordinarily ruling in Queensland pigs weighing 150 lb. to 200 lb. alive on the farm lose about 10 per cent. of this weight in transit to the factory, and then another 20 per cent. in dressing Lighter pigs, weighing 100 lb. to 140 lb. alive, usually lose approximately 33 per cent. by the time they are dressed. Whilst these figures possibly are a fair average, individual pigs vary considerably according to the factors already mentioned.

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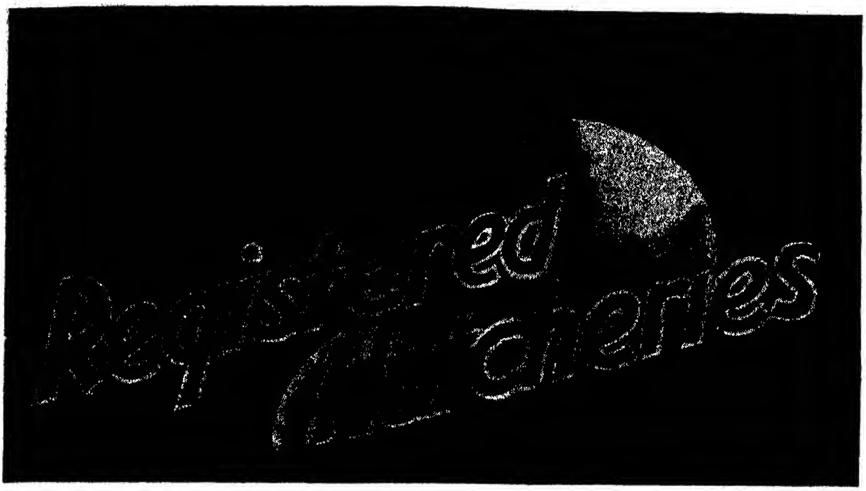


Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca.. ..	White Leghorns and Australorps
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, Rhode Island Reds and Whites
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
G. Grice, Loch Lomond, via Warwick	Kiama	White Leghorns and Australorps
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
Mrs. M. Grillmeier, Milman ..	Mountain View	Australorps and Minorcas
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, Junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns, Australorps, and Rhode Island Reds
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Whitty, Boundary road, Kuraby	Witty's ..	White Leghorns and Anconas
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

CARE OF GROWING PULLETS.

Any special attention or care given to pullets during their growing stage will be well repaid by greater production when they come into profit.

The main points in management which ensure profitable pullets are:—Perching early, separation of sexes, small units, feeding, and sanitation. Pullets should be taught to perch as soon as possible after they have been removed from the brooder. The earlier they become accustomed to perching, the more they spread at night. This prevents crowding and ensures a good air supply for all.

The separation of sexes as soon as the males can be distinguished gives them a much better chance of making good development. Small units also assist in their development and decreases the percentage of stunted pullets, which is the usual result when large numbers are housed together. It is advisable not to house more than 100 pullets in any one unit.

Feeding also is important. The ration should be correctly balanced and the birds given as much food as they will eat. The birds should be given as much mash as they will consume in about twenty minutes; if they require more, it should be supplied. It is advisable to give two meals of wet mash, one early in the morning and the other at mid-day.

In no circumstances should wet mash be left lying about, as it sours rapidly and puts the birds off their food. Dry mash hoppers should be kept well filled and always open. The feeding troughs of both systems should be long enough to provide ample feeding space. Lack of sufficient feeding space is a very common error in dry mash feeding. At least 1 foot of space should be allowed for each ten birds.

Green feed may be supplied with the mid-day meal, unless the birds have access to a well-grassed run. Wet mash should form the bulk of the mid-day meal, unless the dry mash method is used. In dry mash feeding, a small quantity of mash mixed with the greens will tend to increase the consumption of greenstuff. As an evening meal, the pullets should be given as much grain as they will consume.

Clean, cool, fresh water should always be supplied daily, and the drinking vessels should be kept in a shaded position.

Coarse sand, shell grit, and charcoal should always be available, and kept in suitable containers. Each of these materials has an important influence as an aid to digestion and assimilation of food, and is, therefore, invaluable in maintaining health in the flock.

Sanitation also is important and covers the regular cleaning of pullet pens. Wet patches should not be allowed to surround the drinking vessels, and the treatment of perches with creosote to prevent an invasion of blood-sucking parasites should not be overlooked.

INCUBATOR HYGIENE.

It has been proved conclusively that some poultry diseases are transmitted within incubators. Having this knowledge, it is recommended that every incubator operator should do all in his power to minimise the possibility of the spread of disease.

There is little or no difference in the hatching results of dirty and clean eggs, but the filth on eggs may act as a vehicle in carrying disease, whereas clean eggs minimise such possibilities. Therefore, the first thing to do in incubator hygiene is to clean all eggs before placing them in the incubator.

After the chickens have been taken from the incubator the trays should be scrubbed, using disinfectant in the water, and the interior of the machine washed out with a similar disinfectant solution.

The fumigation of the incubator after washing is another precautionary measure which will considerably minimise the possibility of disease being transmitted within the machine.

Fumigation is a very simple process, and the method recommended is both cheap and efficient. Formalin (40 per cent.) and permanganate of potash are used, the quantities varying in accordance with the cubic capacity of the incubator. The following quantities are recommended: Formalin two teaspoonfuls, permanganate of potash one teaspoonful (scraped level with the edge of a knife), to each 20 cubic feet. Put the container in which the permanganate of potash has been placed in the incubator and pour on the formalin, closing the doors immediately. The doors should be kept closed for at least ten minutes.

POULTRY FEEDING.

Poultry raisers are familiar with the general principles of poultry feeding, but there is the possibility that the necessity for vitamins may be overlooked. Many of our commercial poultry farmers and small poultry raisers have been in the habit of using prepared mashes. These mashes invariably contained cod liver oil—an oil particularly rich in vitamins A and D. It is becoming increasingly difficult to secure supplies of cod liver oil, and it is quite possible that many of our mashes are being prepared to-day in which cod liver oil is not used, and in which it is difficult to make provision for the vitamin deficiency that results.

Vitamin A is essential to the health of the fowl, as in the absence of this vitamin a disorder similar to roup, which is commonly termed nutritional roup, occurs. In these circumstances the poultry raiser has to do something to help himself.

Green feed and yellow maize are two common sources of this vitamin. With the smaller poultry raiser, where birds are running on free range, sufficient supplies of this vitamin are obtained, but with the larger poultry raiser the position is somewhat different. Natural herbage is not available, and during the winter months green feed is not plentiful. Where such is the case it is suggested that lucerne dust or soaked lucerne chaff should be fed as extensively as possible. Let the birds be the judge—if they will eat more, give it to them. This is particularly important where wheat and grain sorghum are being used as the sole grain portion of the ration. Where maize is available and can be economically used in addition to feeding greed feed or green feed substitutes, it should form at least one-third of the grain portion of the ration. This will not only protect your birds against nutritional roup, but will improve the yolk colour of the egg, thereby enhancing its value from the consumer's point of view.

GRAIN SORGHUM FOR FOWLS.

Poultry farmers in Queensland generally have to feed either wheat or maize, or a mixture of both, although on odd occasions other grains, such as grain sorghum, barley, and oats are available in limited quantities.

As a result of the activities of the Department of Agriculture and Stock, this season farmers have harvested large areas of grain sorghum. This grain is now available.

Poultry farmers should immediately start feeding grain sorghums to their flocks. As the birds will not be accustomed to this grain, the change should be gradual until such time as the full quantity intended to be fed is supplied each day. As far as is possible, grain sorghum should be used to the extent of one-third of the grain ration at least. Poultrymen who grind grains for the preparation of mashes could replace portion of the other grains with grain sorghum without, in any way, interfering with the food value or the palatability of the ration.

Grain sorghums on chemical analysis compare well with wheat and maize. Experiments conducted in poultry feeding, using grain sorghum, gave favourable results when compared with bran and pollard rations.

In the past, the poultry industry has had to rely on wheat and maize, and frequently these foodstuffs are very scarce and costly, resulting in the margin between food costs and profits being very narrow. In such circumstances, the poultry farmer should encourage the agriculturist to extend the area under grain sorghum by feeding this cereal to his flock. By doing so, this will permit of three foodstuffs being available, and it is well known that a variety of foods increases the palatability of the ration.

The fact that sorghum grains are smaller than wheat should be a decided advantage, more particularly with fowls kept on the intensive system, because when the grain is fed in litter the birds are continuously working and are thus occupied. The feeding of this smaller grain into litter will greatly minimise the vices of feather-plucking and cannibalism.

Agricultural Notes

Legume Inoculation.

THE practice of including a legume crop in a rotation is a common one, and the general belief that the productivity of a soil is noticeably better after a legume than after a non-legume is true, but with the important qualification that this is the case only when an association exists between the roots of the host plant and a certain type of bacteria. Without this association a legume draws on the soil for its supply of nitrogen, as is the case with other plants.

When this association obtains, however, characteristic swellings or nodules are formed on the root system of the host and it is inside these nodules that nitrogen-assimilating bacteria obtain nitrogen from the air and manufacture compounds containing this element which are then passed on to and utilised by the plant for growth. Two beneficial results are obtained from this association. Firstly, the legume itself is furnished with an additional nitrogen supply which enables it to make enhanced growth. This is particularly the case with lucerne when efficient inoculation with the appropriate bacteria greatly aids the rapid establishment of a good stand. Secondly, when the legume is turned in at an appropriate time an increase in soil nitrogen is obtained due to the addition of the nitrogen gained from the air.

Unfortunately, it would appear that these beneficial bacteria are absent from many of our agricultural soils, and under these conditions seed inoculation with a pure culture of the organism—isolated from nodules by bacteriological methods—is essential. These cultures represent a carefully selected strain which has been tested and found to fix nitrogen to the greatest extent, for just as varieties of plants vary in their ability to produce a desired character, so strains of the nodule organism vary in their nitrogen assimilatory capacity. While some strains may be very efficient in benefiting the host plant, others may be of relatively little value, and still others would appear to give no benefit at all. In addition to this, it is important to note that while all nodule bacteria have the same general function of fixing atmospheric nitrogen different cultures are required for different legumes, e.g., a culture of the bacteria suitable for lucerne would be ineffective with cowpeas, and vice versa. Similarly, the strain of bacteria which beneficially associates with garden peas and field peas would be ineffective with white or red clover.

Three points, therefore, immediately suggest themselves—that it is incorrect to presuppose the presence of the appropriate strain of bacteria for one legume just because another legume well equipped with nodules has grown before on the same land; secondly, that if moderate or even good stands of a particular legume are obtained there is no reason to assume that a marked benefit would not accompany inoculation of seed with a selected strain for subsequent sowings; and thirdly, that it is highly desirable that only inoculated seed be sown on new land.

The actual operation of seed inoculation is simple, and consists firstly in obtaining a suspension of the bacteria by mixing the contents of the culture bottle with an appropriate quantity of skim milk. To this is added a small quantity of tricalcium phosphate which stimulates the bacteria to a more active stage, and the seed is then inoculated by pouring the suspension over the seed and mixing thoroughly by hand. In this way each seed is covered with a thin film of milk containing large numbers of bacteria.

Complete directions for carrying out the inoculation, together with the quantity of tricalcium phosphate necessary, accompany any inoculum supplied by the Department of Agriculture and Stock. Farmers intending to sow inoculated seed should write, indicating the amount of seed to be sown, at least ten (10) days before sowing is planned, as this time is necessary for the preparation and despatch of cultures.

COWPEA CULTURE.

The cowpea should undoubtedly be grown much more extensively—as a cash crop for seed, a grazing crop for stock, and for green manure—by Central Queensland farmers than it is at present.

It is a summer annual related more closely to the bean than the pea, and while it thrives best under warm, moist conditions, it grows satisfactorily in the inland agricultural districts and during dry weather, provided that it is warm enough. In addition, this accommodating plant does well on poor soils and is thus useful for enriching them, as it is a supplier of nitrogen.

Cowpeas should be sown from mid-November to mid-December to get the best results. The rates of sowing are very elastic, depending on the nature of the soil, the rainfall, and the purpose for which the crop is required. The sowing may vary from 10 to 20 lb. of seed to the acre, according to variety.

If grown for seed, it is recommended that it be planted in rows 2 feet 3 inches apart at a rate of 8 to 12 lb. to the acre, and from 2 to 2½ inches deep. Seed yields of from 15 to 20 bushels an acre may be obtained under moderately good conditions. The seed can be either harvested and sold—it usually commands a good price (15s. to 20s. per bushel)—or fed in the fields to pigs in conjunction with other foods. A variety grown for seed should be one of the kinds which have been especially developed for seed production as against vine production. The black cowpea is a good type, but others—such as Poona, Groit and Brabham—are now gaining favour.

The cowpea is an excellent crop for grazing, especially for soils and districts where lucerne does not flourish. Having a high protein content, it supplies the necessary balance to the crops of low protein content—such as Sudan grass and other fodders of that type—and thus enables the farmer to provide feed with a proper nutrient ratio for his stock.

As a grazing crop, the best results—unless rainfall is abundant—are obtained by planting in rows 2 feet 3 inches apart and cultivating once or twice. The crop will be ready for grazing in 50 days or so, and yields of from 6 to 8 tons an acre of green fodder may be produced in 70 days under good growing conditions. Many varieties suitable for grazing are available, but Victor cowpea has yielded the heaviest growths in the shortest time at the Biloela Cotton Research Station, producing over 15 tons green weight to the acre in 70 days.

As a green manure crop cowpeas are valuable for orchards or general farm rotations—their deep rooting and nitrogen-fixing habits making them especially suitable for this purpose. Such a planting may be broadcast or sown through a grain drill, and will require 15 to 20 lb. of seed to the acre.

In rotations, the cowpea is an excellent predecessor to a cereal, and is recommended to the notice of dairymen who grow winter wheat or oats for their cows. It should not precede cotton, however, as the nitrate stimulus which follows induces a rank growth of the cotton plant which usually results in a reduced yield.

SUDAN GRASS SEED.

Buyers of Sudan grass seed should make certain that their purchases comply with the prescribed germination standard of 70 per cent.

An examination of seed offered for sale has revealed many undersized and mouldy samples of poor germination, containing an abnormal quantity of unformed or sterile seeds.

Any farmer in doubt as to the quality of seed may forward a 4-oz. sample to the seed-testing station, Department of Agriculture and Stock, Brisbane, for a free test. In doing so, care should be taken to mark the sender's name and address clearly in block letters on the sample, which should be accompanied by a letter of advice of the despatch.

LUCERNE AS A GRAZING CROP.

The success of lucerne as a grazing crop depends so much on the way in which it is treated during growth that every consideration should be given to methods which will prolong the life of the stand and ensure maximum production from it.

If possible, grazing by heavy stock should be avoided for the first twelve months, the best method being to run sheep on the new stand of lucerne and feed only half the growth. This promotes maximum root development at an early period, and establishes greater resistance against summer heat and dry weather.

A common cause of failure with lucerne is overstocking. In a dry spell, when native grasses are going off, there is every temptation to crowd stock on to lucerne paddocks, and the crop is thus over-grazed. Even if plantings have to be made progressively year by year, every effort should be made to bring the area of lucerne up to a level consistent with the maximum number of stock it will be expected to carry. After some experience this can be done without much difficulty, taking into consideration such factors as soil type, carrying capacity of the property, other crops grown, and the conserved fodder available.

Rotational grazing is very desirable with lucerne. Feeding off has to be controlled in order to prevent grazing too close to the ground, which injures the crown of the plant, and may thin the stand out considerably. Grazing in one large paddock is very wasteful.

One of the most important factors in lucerne management is renovation. The beneficial results following this practice have been amply demonstrated on the Western Downs, and it can be stated quite definitely that renovation at least once or twice a year is essential. Tines are preferable to discs for this work because of the danger of cutting the crowns with disc implements. The stirring of the soil around plants helps in the distribution of manure over the paddock, aerates the soil, allows rain quicker access and easier penetration to roots, and forms a soil mulch which decreases the evaporation of moisture. Renovated paddocks, therefore, retain vitality for a longer period, recover more rapidly after grazing and after rain, and are less likely to thin out during droughts.

COTTONSEED MEAL.

Different animals require rations of different compositions, and a study of the distinction between maintenance and productive requirements should be made before deciding on a suitable ration. For example, dairy cows in milk require plenty of protein in the ration if they are to produce to their fullest capacity. Breeding sows require much more protein than fattening pigs. Young growing stock of all descriptions require more protein than adult stock. There is a tendency among some farmers to buy the cheapest feed, irrespective of its analysis; such a practice is often false economy. At this time of the year protein is usually of prime importance, so that, for most classes of livestock, the protein content of the feeds to be used or purchased demands first consideration. If the natural feed is low in protein and thus unbalanced, it is obvious that the feeding of, say, wheatmeal (or barley meal) just because it happens to be cheapest, is not going to give good results, as both are relatively low in protein and high in carbohydrates. In such cases, cottonseed meal (of the grade containing 30 per cent. protein, which can be had for £8 per short ton) is usually much better, especially for dairy cattle. Not only is the protein of good quality, but it is readily digested and palatable, so, under the conditions mentioned, cottonseed meal is worth more than meals of low protein content.

It should always be borne in mind, too, that a ration containing several different ingredients will invariably give better results than a single meal, the reason being that the animal body demands proteins of many different kinds from which to build up the complex proteins in wool, meat, milk, &c. Cottonseed meal combines excellently with pollard, wheat, maize, barley, and other meals of lower protein content, and also with meat and milk proteins used for pig feeding. Although it was once thought that cottonseed meal could not be fed to pigs, research in recent years has proved that a ration consisting of a low protein meal combined with cottonseed meal and meat meal is best, resulting in rapid and economical weight gains and a first-grade carcase for either pork or bacon.

Many sheepowners have obtained excellent results from feeding cottonseed meal as a supplement to pastures of poor protein content, and undoubtedly the feeding of such supplements will become more general in the near future. Graziers would do well to give serious thought to supplementary feeding of cottonseed meal at certain times of the year when pastures begin to fail. A planned experiment on a small scale will very often prove a real eye-opener.

FARM GATES.

On every farm there is always a lot of maintenance work to be done, such as fencing repairs, the making and hanging of gates, the painting of buildings, and the overhauling of machinery, implements, and harness. Some of these jobs can be done during dry weather, and others are better reserved for rainy days.

It is advisable to give attention to the outside jobs first, and, of these, the erection and repair of gates is important. It is surprising to find so many makeshift gates on the farm when strong light gates can be made or bought at very reasonable prices.

Of the different types on the market, the wooden gates are the best, as those having a steel pipe frame, if once bent out of shape, are difficult to straighten, whereas a broken rail or two can readily be replaced. The self-opening types are favoured by some farmers, but these are more expensive and more liable to get out of order than the simpler kind.

Gates should always be swung on good heavy posts placed 4 feet in the ground, with a sill log in between. The hinges, which should be strong, are generally placed in a vertical line. Occasionally, it is desirable that the foot of a gate should lift when opened, and this can be arranged by placing the lower hinge half an inch off the plumb in the opening direction.

The materials required to make a double five-barred bolted gate for a 12-foot opening without any morticing are—

112 running feet of 3-inch by 1-inch or 4-inch by 1-inch timber;

3 lb. of $3\frac{1}{2}$-inch by $\frac{3}{8}$-inch bolts and washers;

2 pairs hook and eye hinges 2 feet by 2 inch by 5/16 inch.

Butts and heads should be cut 4 feet long, and should be double—that is, placed on each side of the bars. The bottom of the first rail should be 3 inches from the bottom of the upright. The distance between the first and second rails should be 6 inches; between second and third, 6 inches; between third and fourth, 7 inches; and between fourth and fifth, 8 inches. There should be two double stays on either side of rails on each gate, running from the bottom of the butt to the top of the head.

When hinges are being placed in position, small pieces of 3-inch by 1-inch timber should be inserted against the rails for packing purposes. A sliding piece of 3-inch by 1-inch timber along the third rail between the stay and the head makes an excellent fastener.

Gates are not finished until they have been painted, and if the first two coats are given before the gates are put together, the job will be easier and considerable time will be saved.

CARE OF IMPLEMENTS KEEPS DOWN COSTS.

Care of farm machinery keeps down costs in running a farm by saving expense in repairs and replacements.

Regular and thorough lubrication always pays. A few minutes occasionally spent in checking over adjustments, overhauling canvases, tightening up loose nuts, and so on may often prevent a breakdown and save both worry and expense at a busy time, apart from the fact that a timely overhaul, particularly of harvesting or seeding machinery, will ensure that any duplicates which may be necessary are available when required.

A shed should be the only home for the plough, combine and header, and, in fact, all machinery when not in use. Machinery depreciates quite heavily enough, even when used and looked after with care; continuous exposure to the elements probably doubles depreciation.

Another point well worth consideration is to know when to scrap. New and better machinery is being evolved almost every year, and with which faster and more efficient work can be done, so there is every temptation to scrap or sell what one has and buy the newer model. Sometimes it does pay to scrap existing plant and buy the more efficient implement—the header has replaced the stripper, the combine the drill, and so on—but every additional purchase should be considered on its merits. The question should be: Will it pay? Can the old machine be adapted to approximate the work of the new one? Prematurely placing a half-worn machine on the scrap-heap or market just to save a few days with a new implement may not be profitable. It is a matter which calls for careful thought, with an eye always on practical farm economy.

THE CONTROL OF MEAT ANTS.

The meat ant is a common and widely distributed insect which nests in mounds. These mounds may be several feet in diameter and are raised slightly above ground level. A number of entrance holes lead to an extensive series of subterranean galleries, where eggs are laid by the queen and the immature stages are tended by the workers. Distinctive foraging tracks lead from the nests, often for a distance of some chains.

Though they seldom attack plants, meat ants have a considerable nuisance value if the nests are close to buildings, stock yards, &c., for the workers invade food stores, find their way on to animals, and, though not capable of stinging, frequently bite both man and beast. Quite apart from these characteristics, the nests themselves often disfigure paths, gardens, and tennis courts, and there they must be destroyed.

Control should be carried out at the nest itself; palliatives which aim at merely protecting buildings from invasion have no permanent value and are seldom really effective. Fortunately, the nests can be easily located and their destruction by fumigation is a comparatively simple matter. Two fumigants can be used; these are carbon bisulphide and calcium cyanide.

When using carbon bisulphide, a small quantity of the liquid is poured into each entrance hole and the mound is then covered with wet bags. Three or four minutes later the bags are removed and a light, held at the end of a pole not less than 5 feet in length, is placed at several points on the surface of the mound. A series of muffled explosions follows, and these shatter many of the subterranean galleries penetrated by the gas. Five minutes later the bags are replaced over the mound. Nests up to 4 feet in diameter require about half a pint of carbon bisulphide, but a greater quantity must be used in larger nests.

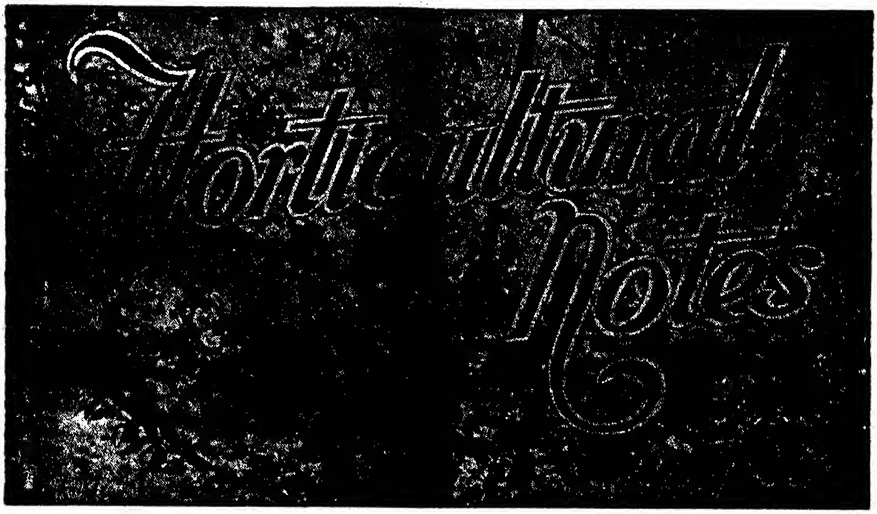
Calcium cyanide releases prussic acid gas on exposure to the air. It is introduced to the nest by a blower or simply by pouring it into the entrance holes. All these must be treated and then plugged to prevent the escape of the fumes. From 1 to 4 oz. of calcium cyanide are required, the amount depending on the size of the mound.

Frequently mounds are linked by underground tunnels, and unless all those linked in this way are treated, repopulation of any one which may be fumigated is rapid. All mounds in an area should be fumigated and not merely the one which is the apparent nuisance. Treatment should also be carried out when the greater part of the colony is within the mound and when the soil is comparatively dry. Both fumigants are poisons and must be used with the requisite care.

THE PASTURE SEED-BED.

Seed-beds of various types, ranging from uncultivated forest land to the onion-bed type, are used for sown pastures. The seed-bed provided by partly cleared forest land, even though some form of harrowing has been done, is very unsuitable for pasture establishment, the competition of native grasses and undergrowth usually proving too vigorous for the seedlings of sown pastures. Likewise, established pastures of native or other grasses are not receptive of additional pasture plants unless a disturbed seed-bed is provided, and a temporary check given to the growth of the established plants by drastic harrowing. The ashes from scrub burns provide quite a good seed-bed for pasture plants.

By far the best seed-bed is that resulting from the thorough tillage of fertile soil. Most of the common pasture plants have small seeds and require a seed-bed of fine tilth, and by compacting the soil close to the surface a seed-bed is provided which is favourable to the fine, early root systems of the pasture plants. The seed-bed should contain ample moisture, and in dry districts particularly, cultural operations throughout the seed-bed preparation period should be done with due regard to the conservation of moisture. Ploughing well in advance of sowing is desirable, and the land should be allowed to lie in the rough state for a few weeks before further cultivation is undertaken. Heavy tine harrows, or a spring-tooth cultivator, will be required to break down the clods. Subsequent working should be designed for the destruction of weeds and the compaction of the sub-surface soil, and shallow harrowings will help. If the land becomes weedy and the surface sets hard, a disc harrow may have to be used to destroy the weeds. Rolling before sowing may be desirable in cases where the ordinary cultivation has not sufficed to form a fine seed-bed.



Colouring Citrus Fruits.

As citrus fruits are only sold to best advantage when they are mature, full flavoured and showing an unblemished skin with its normal ripe colour, aid in colouring fruit lacking in normal colouring, but which possess the other required qualities, will enhance their market value.

All who have had experience in citrus-growing in various districts agree that certain varieties of oranges and mandarins growing in the cooler regions have ample colour long before they attain sufficient sugar to make them desirable for eating purposes, while fruits produced in warmer climates are sweet and luscious for some time prior to their attaining a normal ripe colour. It is these latter fruits, and also lemons, which are, as a rule, picked when they come within a standard range of sizes, and not left to colour on the tree, that colouring may sometimes be advantageous.

The colouring or forced curing, a practice known in California as "sweating," was formerly done by gas generated from kerosene stoves. In 1924, Denny* found that ethylene gas in small quantities—1 part in 10,000—was capable of producing the same results. He also found, however, that a very high percentage of gas (for example, 80 per cent.) delayed colouring. Colouring also was delayed by temperatures as high as 92 degrees F. and as low as 45 degrees F. A temperature of between 60 and 70 degrees F. with a humidity of from 70 to 75 per cent. was found satisfactory.

Ethylene gas can be obtained in metal cylinders under high pressure, with regulator valves attached to the cylinders. When released from the regulator valve, the gas is conveyed by tubing into the colouring chamber. The quantity of gas passing into the room is recorded by the valve on the cylinder, so the correct charge according to the size of the chamber can be readily determined.

It also has been found that a very small quantity of acetylene gas (1 part in 5,000) colours satisfactorily mature citrus fruits. To determine the dosage required, the air space remaining after the chamber has been loaded should be known. One ounce of carbide generates sufficient gas for every 75 cubic feet of air space. For practical purposes, it is sufficient to allow 1¼ cubic feet displacement for each bushel case of fruit placed in the chamber. For example, the following table illustrates the dosages required for a chamber of 200 cubic feet capacity with a varying number of cases:—

No. of Bushel Cases.	Air Space.	Dosage.
40 ..	150 cubic feet ..	2 oz. carbide
20 ..	175 cubic feet ..	2⅓ oz. carbide
10 ..	187½ cubic feet ..	2½ oz. carbide

* F. E. Denny, Jour. Ag. Res. (1924).

The colouring of citrus fruits is accompanied by greatly increased respiration. The life processes are stimulated, and usually an abscession layer is formed that results in the loss of "buttons." It has been found that certain forms of physiological breakdowns are greatly aggravated, more especially red blotch and, to some degree, membranous stain. If the gas is too strong, it may weaken the tissue and open the way for moulds, stem-end rots, and other forms of decay resulting from weakened tissue; this, however, can be greatly reduced by keeping the gas sufficiently dilute.

Too much stress cannot be given to the fact that the utmost care should be taken if the successful colouring of mature citrus fruits is to be accomplished.

Some of the factors operating while the fruit is on the tree are moisture, temperature, wind, insect, and other injuries, cultural conditions and time and rate of growth of the fruit. Moisture, as well as temperature in both air and soil, is important in determining whether weak or strong fruit will be produced. Wind, in affecting moisture and in producing injuries from which decay may be accelerated during colouring also are important factors. Cold or extreme heat, both conditions of temperature, also are contributing factors towards decay. These extremes may impair the resistance of the fruit, even when the tissue is not visibly affected. The time and rate of growth of fruit also are important factors.

To colour oranges, mandarins, and grape fruits satisfactorily, they should have reached maturity, for if too green or immature they will not develop a normal ripe colour, but will shrivel and become dull and dirty in appearance. Lemons are picked, as a rule, when they come within a standard range of sizes. Lemon trees bloom and bear fruit during all seasons, and must, therefore, be picked at frequent intervals. The best lemon for market is one picked when green and left for several weeks in the packing shed to colour. As lemons colour on the trees at different sizes, depending on the season and physiological condition of the tree, the picked fruit as it comes from the orchard is usually made up of what is known as "dark green," "light green," "silver," and "yellow" or "tree ripe."

All fruits to be coloured require to be treated with special care in handling. Due regard also should be given to factors operating while the fruit is on the tree—such as irrigation, rains, winds, and extreme temperatures immediately prior to or at picking—as these are important factors governing the resistance of the fruit against physical breakdowns and decays.

Bruises show up as greenish areas; oil liberated from the rind may cause spotting; while if the residue of oil or Bordeaux sprays remains on the fruit, it will be found to come from the colouring room spotted and unsightly.

Colouring chambers may be built of timber, or other suitable materials insulated and lined. Ventilators should be placed opposite to the door. A convenient and economical size is one to hold from 40 to 50 bushel cases. Allowing 5 cubic feet air space for each case, the chamber would require to be 200 to 250 cubic feet in capacity. Even where large numbers of cases are to be treated, it will be found more satisfactory to build two medium-sized chambers than one large one.

For oranges, mandarins, grapefruit, and lemons, an average temperature in the chamber of between 65 and 75 degrees F. will prove satisfactory. If the temperature falls below 65 degrees F. the colouring process is retarded. On the other hand, high normal temperatures are not likely to affect the fruit, no ill effects having been shown by temperatures up to 89 degrees. However, the humidity will require to be adjusted; in the case of a very dry atmosphere an open container of water may be introduced to moisten the air and prevent withering of the fruit; while when the humidity is high and likely to cause softening of the fruit, it may be reduced by placing sand, caustic soda, or quick lime on the floor of the chamber.

All fruits should be sweated for twenty-four hours before being placed in the colouring chamber, graded for colour and placed loosely in trays or open cases having plenty of ventilation. Dunnage or "packing" should be used in stacking so that free circulation around each case is permitted.

The required amount of ethylene and acetylene gas is introduced slowly into the chamber—in the case of ethylene by opening the regular valve; and of acetylene gas by placing the required quantity of carbide in a suitable container, arranging a second vessel containing water in such a way as to permit the water to slowly drip on to the carbide, thus generating the gas which is led into the chamber by means of suitable piping.

After closing the chamber and making sure that it is airtight, it should be charged and allowed to remain closed for four hours. It should then be opened and aired thoroughly for at least two hours, after which it may be charged again, and the performance repeated as often as necessary. Between nine and fifteen charges should be sufficient to give mature citrus fruits their normal ripe colour.

TOMATO SEED-BED DISEASES.

The following diseases may occur in tomato seed-beds in Queensland:—Irish blight, target spot, Septoria leaf spot, bacterial wilt, Fusarium wilt, bacterial canker, damping-off, and possibly the virus troubles. Growers planting seed-beds at the present time—e.g., those in the Stanthorpe area—are not likely to be troubled with Irish blight, but target spot and collar rot (both of which are caused by the same fungus) may be serious.

The utmost care in managing seedbeds is always justified, for here the whole crop is concentrated into one single patch. As a result of this proximity of the plants to each other the spread of a disease is often very rapid and the effect disastrous, resulting in the loss of several weeks in planting up and the failure to catch the advantages of an early market.

There are three points during the production of tomato seedlings at which some control of diseases may be exercised—

(i.) Before planting seed, by—
   (*a*) Sterilising the seed-bed;
   (*b*) Disinfecting the seed;

(ii.) At the time of planting, by arranging the seed in rows instead of broadcasting it;

(iii.) After emergence of the seedlings, by dusting and spraying with a fungicide.

Seed-bed.—The placing of a seed-bed on virgin soil is usually sufficient protection against soil-borne troubles other than nematodes, but if there is any doubt about this point then sterilisation should be practised. The two most suitable methods are by fire and by formalin.

Firing.—Brushwood and branches should be laid evenly over the bed and the surrounding margin. The quantity of wood required can be reckoned as the equivalent of a solid layer of about 3 inches thick. The soil should be moist and neither dry nor excessively wet when firing takes place. Where wood is readily available the fire is the cheapest method.

Formalin.—When using formalin in the seed-bed, allowance should be made for the fact that the seed cannot be planted until some twelve to fourteen days after application of the liquid. The beds are prepared ready for planting, and preferably should be moist but not wet. If the soil is dry use a 1 per cent. solution of formalin (1 gallon of commercial formalin in 100 gallons of water), and apply with a watering can at the rate of 10 gallons to the square yard. If the soil is moist, use a 2 per cent. solution of formalin watered on at the rate of not less than 5 gallons to the square yard. The beds, as soon as treated, are covered with sacking for two or three days to keep in the fumes. They are then aired for a further ten days or until the odour of formalin can no longer be detected, after which they are ready for use.

The target spot organism, which causes a black spot on the stem and may result in the seedlings suffering a collar rot just at soil level, appears to carry over in the soil. Other damping-off organisms may also be present.

Seed.—Seed treatment has always been a general recommendation, though only a few growers have made a routine practice of it. In the light of recent observations, however, it is strongly recommended that all growers should treat their tomato seed with corrosive sublimate before planting. If it is known that the seed has come from a sound, healthy crop, then treatment is not necessary. In most cases, however, the seed source is not known.

Tomato diseases shown to be carried by the seed include Irish blight, target spot, Fusarium wilt, bacterial wilt, bacterial canker, and mosaic.

It must be understood clearly that the action of this corrosive sublimate treatment is to destroy any disease-producing organism which may be adhering to the outside of the seed, and so prevent the introduction of a disease into the seed-bed. It does not in any way protect the seedling against a disease which may attack it after it has emerged. A small percentage of the disease organism may be present inside the seed, and so be unaffected by the treatment, but this is usually of no practical importance. In the case of bacterial wilt and bacterial canker, seed treatment is the most important method of control.

The seed treatment is summarised as follows:—

The tomato seed is placed in a piece of mosquito netting and suspended in a solution of corrosive sublimate (mercuric chloride), one part to 3,000 parts of water,

for five minutes. The seed mass is stirred occasionally with a wooden stick during this period to remove air bubbles. After that it is thoroughly washed in four or five changes of water and dried. It is recommended that the seed be sown immediately after treatment. Corrosive sublimate tablets, with directions for the preparation of the solution, should be obtainable at any chemist.

Planting.—Growing conditions include many factors, of which the more obvious —such as soil tilth and sufficiency of plant foods—are well known to growers. The point for consideration here is whether the seed should be broadcast or planted in rows. In order to control disease better, the latter method is preferable. Distances of about 6 inches between rows allow easy penetration of the dust or spray to the stems, and also prevent the formation of a still, humid atmosphere beneath the leaf canopy, as is found when plants are broadcast.

Spraying.—Regular spraying or dusting with a copper compound is necessary. If using a wet spray, Bordeaux mixture of 2-3-40 strength is recommended. Care should be taken not to spray the seedlings too heavily, as an accumulation of spray liquid in the centre of the plants may result in a burning of the young foliage. In the case of dusts, any of the proprietary copper dusts may be used. Heavy applications of these dusts should not be made on seedlings if much free moisture is present on the young plants, especially if warm weather is likely to follow. Under such conditions burning may result with either copper carbonate or copper sulphate dusts.

At various times the grower will have to include in his spray or dust arsenate of lead and nicotine or nicotine sulphate for insects such as caterpillars and aphids. For tomato mites a separate dusting with sulphur is the most suitable. Dust mixtures are available which contain the various insecticides in addition to copper compounds.

JERUSALEM ARTICHOKE.

Like the sweet potato, the Jerusalem artichoke should attract much more attention as a crop than it does at present, more particularly by pig raisers in the drier farming districts, for not only is it drought-resistant, but its tubers are highly nutritious as well. The yield may range from 6 to 8 tons or more per acre, and although the plant does best on good friable loams, it will thrive on sandy, gravelly, or clayey soils, which enables the poorer patches of soil on the farm to be put to a profitable use.

The area intended for Jerusalem artichokes should be prepared in much the same way as for potatoes. The crop may be planted in early spring in furrows 3 feet apart, with the sets 2 feet apart. This spacing with medium-sized tubers will entail the use of between 4 and 5 cwt. per acre.

As with maize and potatoes, until the crop is 4 inches high, all cultivation can be done with tined harrows working across the drills. Afterwards, the cultivator should be used as the condition of the soil and weed growth necessitates.

PASSION FRUIT.

Passion fruit vines are prone to several diseases which, with proper attention, can be controlled, but which, when the vines are allowed to grow uncared for, quickly destroy them. Because of these diseases and the old haphazard method of cultivation, the idea has become current among orchardists that vines can be grown only for about two or at most three years. That this is erroneous has been demonstrated by growers who have made passion fruit culture their main occupation, and who have vines bearing well at seven years of age. These growers, however, prune correctly and spray at the right times, as advised by officers of the Department of Agriculture and Stock. They also grade and pack their product carefully for market.

It is stated by some that passion fruit growing entails too much work pruning and spraying, and that the results are not worth it. That is not necessarily so. Pruning the vine certainly is a tedious and lengthy operation. Spraying also is objectionable, but it should be remembered that citrus growers, grape growers, and practically all other fruit growers must also prune and spray.

Good passion vines produce up to half a bushel of fruit a year. They are usually planted 15 feet by 8 feet apart, or 363 vines to the acre. On a conservative average of 3s. 6d. per half-bushel clear of marketing expenses the return would be £63 per acre per annum. Are there many other fruit crops netting orchardists this sum per acre?

The passion vine thrives in warm, moist situations, preferably in the coastal districts. It grows well on the coastal highlands, like the Blackall Range and Tamborine Mountains, and also on the lowlands between these and the sea. The vine will resist light frost, but heavy frosts will cause damage.

Reasonably fertile scrub and forest loams, provided they are well drained, are suitable soils, and if a hillside site is chosen it should be well sheltered from heavy winds, and preferably have an easterly or north-easterly aspect. It is important that the trellises be strongly made, and that they be at least 6 feet in height.

Two crops are borne each year, a summer and a winter crop, while occasionally intermediate crops are borne.

Spring is the best time to plant, although autumn planting is sometimes practised. Spring-planted vines sometimes return a small crop the following winter, but the first main crop can be looked for twelve to fifteen months after planting. With autumn-planted vines the first main crop often is not obtained until eighteen to twenty-one months after planting.

A pamphlet giving full cultural details is available free on application to the Department of Agriculture and Stock.

THE WATER MELON.

Three essential requirements for successful water melon production are a warm climate, a reasonably fertile soil, and abundant water. Because of the latter necessity, commercial production is practically limited to coastal districts, although inland good crops can be grown where irrigation is available. The most suitable soils are those of a sandy loamy nature, to which has been added a fair amount of organic matter, preferably animal manures where these are available.

An application of artificial fertilizer worked into the soil a week or so before planting also is desirable, and the following is recommended per acre:—

1½ to 2 cwt. sulphate of ammonia.
3 to 4 cwt. superphosphate.
1½ cwt. sulphate of potash.

The land should be deeply ploughed during the winter, and properly broken down ready for planting in the spring. In the southern part of the State, August and September are the best months to plant, though seed sowing may be carried on until December. Further north, planting may commence in July.

Seed may be planted singly about 1 inch deep and 2 feet apart in rows about 4 feet 6 inches apart, or three or four seeds may be planted together in "hills" made about 6 feet apart each way. Two pounds of seed are required to plant an acre.

Rotation of crops should be practised with melons, which should not occupy the same ground for more than two years in succession.

When the main runners are 4 to 6 feet in length, or when the first flower drops and the fruit starts to set, the tips may be cut off to induce the vines to branch. In no case, however, should the pruning be done closer than two or three joints from the nearest flower or setting fruit. Whilst the vines and fruit are growing, they must be kept well watered, and if the weather is excessively hot it is advisable to cover each melon with a handful of straw. When the fruit begins to ripen the water supply may be cut off.

Water melons take three to four months from seed sowing to maturity.

Difficulty is often experienced by new growers in determining when a melon is ripe and ready to pick. Some experts can tell by giving the fruit a slight crushing, when the creaking of the breaking flesh inside will indicate ripeness. Apart from

this, there are two sure ways of testing for ripeness. When the little tendril on the vine near where the fruit breaks away begins to wither, it indicates that the fruit is ripening; but when the tendril at the next joint of the vine also dies, the melon is ripe.

Another test is to turn the melon over and examine the skin which has been in contact with the ground. At first that part is white, but as the melon ripens it turns a darker colour.

Some good varieties are:—

Early Yates.—Extra early maturing, medium size, good cropper, light mottled green colour.

Kleckley Sweet.—Long dark green, medium to large size, excellent flavour.

Tom Watson.—Large dark green, good carrier.

Cuban Queen.—Very large long melon, good carrier.

HOW TO PLANT A DECIDUOUS FRUIT TREE.

From the time fruit trees leave the nursery until they are permanently planted they should never be left exposed to sun, wind, or air when it can at all be avoided.

Trees waiting for planting should be heeled-in with moist earth about the roots, and only taken out of the ground when actually needed for setting. The hole dug for a tree should be large enough to permit the roots to spread out naturally in all directions. It is unnecessary to dig wide holes if the trees are heavy-rooted, for the roots must be trimmed back at transplanting time.

All broken, torn, and dead roots should be cut back to fresh living wood. When the clean-cut surfaces come in contact with moist soil, new roots are formed very readily.

Filling in the holes is most important in planting the tree. To get the best results, moist soil must be placed closely around the roots, preferably by hand, so that no air holes or crevices are left.

When the trees are placed in position the roots are spread out and a shovelful or two of fine earth thrown in upon them. The soil should be carefully worked in between the crevices and, when the hole is about one-third full, the soil about the roots of the tree should be trampled down firmly. Moving the tree up and down, while the earth is being filled in, will assist materially in eliminating air holes and in bringing the soil into close contact with the roots. There is little danger of the earth being over-packed, but trees often die for lack of trampling.

After the roots are all covered and packed in tightly the hole may be filled in with loose soil. Trampling the top of the ground after completely filling the hole is undesirable.

When planting the tree allowance must be made for the looseness of the ground in deciduous fruit areas in the Stanthorpe district. If the tree is set only as deep as the collar, it will be well out of the ground twelve months later when the land has settled down. Hence, to ensure the best results, the collar of the young tree should be from 4 to 6 inches below the surface of the ground. In twelve months' time the collar will be at the proper depth—namely, level with or just under ground level.

If possible, trees should be planted not later than the end of July. The root system will then be established before the buds start to shoot. Later planting is apt to be too great a tax on the tree's resources.

Since the roots have been cut back prior to planting, it is necessary to cut back the top of the tree proportionately in order to maintain a balance between the top and the root. If this is not done, the tree, when it comes into leaf, will lose moisture faster than the reduced root system can supply it, and death may result.

A tree should be headed low—the best height being 18 inches to 2 feet. The most uniform orchards are made by setting whipsticks in preference to headed trees. With whipsticks, the grower can form any desired type of head, whereas trees headed in the nursery often possess badly formed heads which have to be cut off and reformed in the orchard.

Three or, at most, four main limbs at the start are enough for any fruit tree. If properly placed on the trunk, it will never be necessary to cut out a large limb, a practice which is undesirable except in the most extreme cases.

The main limbs should not all start out at the same height from the trunk, for if all the weight of limbs and of fruit is directed at a single point the tree is liable to split. Opposite crotches should be avoided.

The after-cultivation of freshly planted trees, as well as all other trees, is most important. It is a loss of both time and money to plant trees unless the orchardist is prepared to look after them. Young trees left to struggle against weeds, drought, and a poverty-stricken soil suffer severely. If by chance they do survive they become stunted and are never of much value. Great care is necessary in cultivating an orchard, for the careless use of horses and implements can do very great harm to the trees.

SOIL EROSION NATURE'S "FIFTH COLUMN."

If a certain amount of control work is done every year in the way of conserving both soil and fertility on holdings that are subject to erosion, almost any farm can be put in a safe position in ten years.

That opinion was expressed by Mr. H. A. Fraser, project manager of the Cowra Soil Conservation Research Station (N.S.W.) at a recent field day. To carry out conservation effectively, he said, it was necessary to go into the question of altering the land use practice. Land too steep for cultivation should be put down to pasture and the flatter and low slopes should be devoted to cultivation on a wide rotation basis. Every effort should be made to reduce the incidence of bare fallow from the customary once in two years to once in four, five, or even six years.

Cultivation land subject to erosion should be contour farmed with the necessary contour banks correctly located and constructed properly to detail. Consideration was necessary, first of all, to the disposal of the water, and in many cases a waterway should be established before the banks were built. The best form of outlet protection was vegetative cover.

Landholders were warned against the indiscriminate diversion and haphazard placement of contour banks, and advised them, before embarking on major works, to consult competent authorities and start out with a general farm plan.

The adoption of a sound rotation system, in which pasture improvement was given its correct place, was the most important basis on which to found conservation activities.

"The practice of burning stubble should be immediately dispensed with," said Mr. Fraser. "This valuable material should be left to rot and cover the ground in the late summer or autumn, when the much-needed protection will prevent an excessive amount of damage being done by seasonal storms. The feeding of stock to relieve the strain on pastures and vegetative cover would do much to reduce the menace of erosion."

The use of increased amounts of superphosphates on crop or grassland would increase the amount of grass cover and grazing available, and would, when managed correctly, provide permanent cover for the greater part of the year.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

MARCH is always a month of transition from temperate to tropical fruits. Now is the time for special attention to every requirement of the interstate markets, for Queensland has practically a monopoly of the tropical fruit supply. To establish and maintain a reputation for quality should be the aim of every grower, and popular demand depends on a regular supply of good quality fruit at reasonable retail prices. Carelessness in marketing methods increases the quantity of unsaleable fruit to such an extent that even though retailers buy cheaply, the quantity of first-grade saleable fruit is so small that high prices have to be obtained to cover waste. While the effect of careless methods is bad on the Brisbane market it is very much worse on the Southern markets. During a recent duty tour of the Sydney markets, one was staggered (there is no other words for it) by the amount of avoidable waste and other depreciating factors which characterised some Queensland consignments. This avoidable waste costs the Queensland industry hundreds of pounds weekly—that is money directly out of the pockets of growers, because of sheer neglect of the observance of sound principles in fruit marketing.

Here is a summary of some of the faults observed in different consignments from this State:—*Pineapples*—Some consignments were affected by water blister to the extent of 100 per cent. Old factory packing cases contained the worst lines under offer. Faulty handling of fruit was too frequently in evidence. Growers should know that pineapples should not be cut or trimmed in any part, whether tops, bottoms, or abnormal growths. *Bananas*—Much fruit was arriving on the markets which had obviously been packed when "plantation ripe." *Custard Apples*—Most lines were in good condition, but some were affected with mealy bug. Fruit should be mature and free from pest attack. *Grape Fruit*—Some poor seedy lines were observed. Present prices are high, but if growers, as in past seasons, send immature fruit, values will soon topple over. *Papaws*—The mixing of coloured fruit with fruit showing no colouring in the one case reduced the value of consignments. During the December-March period, all care should be taken with our tropical fruits to exclude damaged units, or units advanced too far towards full ripeness, from market consignments, because of the humidity usual during that period causing skin damaged or ripe fruit to "break down" quickly. Practices which a grower may "get away with" during cooler weather will greatly reduce his returns from his summer consignments. On the other hand, ripe fruit may be placed on the Brisbane market with less risk of the loss that is the usual experience with faulty fruit, or fruit too near complete ripeness, in the interstate trade.

Prices during the last week of March were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 7s. to 13s.; Sixes, 9s. to 16s.; Sevens, 7s. to 17s.; Eights, 9s. to 18s.; Nines, 8s. to 17s. Bunches, 3d. to 10½d. dozen. Lady Fingers, 3d. to 7½d. per dozen. Sugars, 3d. to 6d. per dozen.

Sydney.—Cavendish: Sixes, 11s. to 14s.; Sevens, 13s. to 15s.; Eights and Nines, 16s. to 19s.

Melbourne.—Cavendish: Sixes, 11s. to 14s.; Sevens, 14s. to 16s.; Eights and Nines, 16s. to 18s.

Pineapples.

Brisbane.—Smooths, 2s. to 5s. per case; 1s. to 4s. per dozen. Roughs: 5s. to 9s. per case; 1s. 6d. to 5s. per dozen.

Sydney.—Smooths: 5s. to 10s. per case. Small sizes slow of sale.

Melbourne.—Smooths: 6s. to 11s. per case. Small sizes slow of sale.

Papaws.

Brisbane.—Yarwun, 10s. to 24s. tropical case.

Sydney.—10s. to 15s. tropical case.

Custard Apples.

Brisbane.—4s. to 5s. half bushel.

Sydney.—5s. to 8s. half bushel.

Melbourne.—6s. to 8s. half bushel.

Monstera Deliciosa.

Brisbane.—3s. per dozen.

Sydney.—3s. to 4s. half bushel.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels: 7s. to 9s. bushel. Valencias: 6s. to 8s.

Sydney.—Navels: Queensland hard of sale, immature, and poorly coloured. Valencies: 5s. to 9s.

Grapefruit.

Brisbane.—6s. to 8s. bushel.

Sydney.—Gayndah, 16s. to 20s.; others 8s. to 14s.

Melbourne.—14s. to 17s. Only choice varieties wanted.

Lemons.

Brisbane.—6s. to 14s. bushel.

Sydney.—Gayndah, 13s. to 18s.; others 6s. to 12s.

Rosellas.

Brisbane.—2s. to 3s. bag.

Sydney.—3s. half bushel.

Passion Fruit.

Brisbane.—Firsts, 8s. to 12s. half bushel; Seconds, 4s. to 6s. half bushel.

Figs.

Brisbane.—7s. to 9s. dozen boxes; trays, 2s. to 3s.

Grapes.

Brisbane.—Coleman, 4s. to 5s.; Waltham Cross, 3s. 6d. to 8s.; Black Muscat, 2s. to 7s.; Purple Cornishman, 6s. to 9s.

Sydney.—Queensland Colemans, 2s. to 6s.; Walthams, 4s. to 7s. Many lines of Colemans over-ripe during third week of March.

Apples.

Brisbane.—Stanthorpe Granny Smith, 6s. to 7s. 6d. Imported dessert apples, 7s. 6d. to 9s.

Tomatoes.

Brisbane.—Ripe, 3s. to 6s 6d.; coloured, 4s. to 9s.; Stanthorpe, green, 2s. to 4s.; local, green, 3s. to 6s.

Sydney.—Victorian Portland, 12s. to 14s. bushel; New South Wales, Orange and Barlow, 4s. to 8s. half bushel; Stanthorpe, 3s. to 5s.

VEGETABLES, ETC.

Beans.—Stanthorpe, 10s. to 13s. bag; others, 7s. to 9s.; Sydney, 5s. to 10s. case.

Peas.—Stanthorpe, 8s. to 11s. bag.

Cabbages.—Stanthorpe, 6s. to 10s. bag. Local, 1s. to 6s. dozen.

Carrots.—6d. to 1s. 6d. bundle.

Lettuce.—2s. to 4s. dozen.

Beetroot.—4d. to 1s. bundle.

Marrows.—7s. to 9s. bag.

Pumpkins.—3s. to 4s. bag.

Chokos.—3d. to 6d. dozen.

Cucumbers.—1s. to 2s. dozen; 8s. to 10s. bushel case.

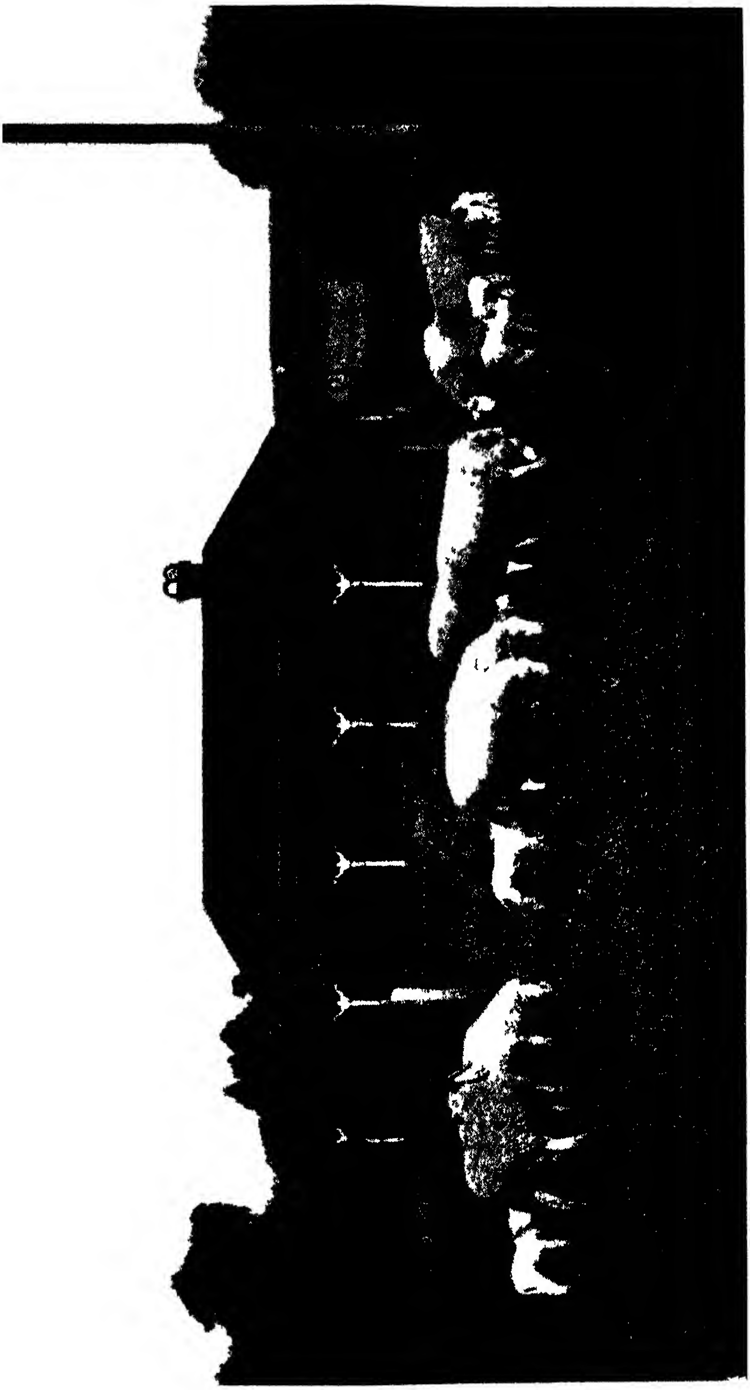


Plate 69.

Dorset Horn Ewes and Lambs, Cambooya, Darling Downs, Q.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society and the Ayrshire Cattle Society, production charts for which were compiled during the month of February, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORNS.			
	MATURE COW (STANDARD, 350 LB.).			
Alfa Vale Model 4th	W. H. Thompson, Alfa Vale, Nanango	15,717·5	678·526	Reward of Fairfield
Alfa Vale Gentle 2nd	W. H. Thompson, Alfa Vale, Nanango	15,518·65	640·529	Reward of Fairfield
Alfa Vale Midge	W. H. Thompson, Alfa Vale, Nanango	15,635·2	576·568	Reward of Fairfield
Merravale Bonnie 3rd	W. Soley, Malanda	9,940·55	379·644	Greyleigh Honorarium
	SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Kyabram Mab	Clarence W. Black, Kumbia, *via* Kingaroy	16,962·63	732·906	Ledger of Greyleigh
	JUNIOR, 4 YEARS (STANDARD, 310 LB.).			
Trevor Hill Picture	W. Henschell, Yarranvale, Pittsworth	16,057·83	643·935	North Glen Emblem
Alfa Vale Model 11th	W. H. Thompson, Alfa Vale, Nanango	14,896·6	635·207	Reward of Fairfield
Fairlie Beauty 29th	C. B. Michell, Fairlie, Rosenthal	9,584	412·582	Rosenthal Peggy's Admiration
Burradale Rosetta 31st	J. F. Evans, Malanda	10,546·2	368·519	Dulcamah Irish Peer
Mabreen's Nancy 2nd	F. Haldane, Wolvi	8,732·6	328·681	Dnalwon Boston
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Ardilea Sadie	W. Hinricksen, Ardilea, Clifton	7,146	294·929	Midget Shiek of Westbrook
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Trevor Hill Una	Sullivan Bros., Valera, Pittsworth	8,826·47	377·95	Corunna Supreme
Fairvale Dulcie	J. H. Anderson, Fairvale, Southbrook	7,591·94	297·221	Fairvale Optimist
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Fairvale Dainty	J. H. Anderson, Fairvale, Southbrook	9,343·7	382·681	Fairvale Czar
	JERSEY.			
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Glenview Mischief	F. P. Fowler and Sons, Glenview, Coalstoun Lakes	9,914·55	466·162	Trinity Governor's Hope
Bellgarth Pretty Lady 2nd	P. Kerlin, Glenrandle, Killarney	6,140	321·883	Bellgarth Bellboy 2nd
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Inverlaw Fairy Fly	R. J. Crawford, Inverlaw, Kingaroy	8,642·7	471·055	Oxford Royal Lad
Banyule Silvermine 11th	Farm Home for Boys, Westbrook	8,242·95	425·276	Banyule, Oxford Don
Keystone Lavender	E. J. Keys, Proston	7,408·15	394·011	Gunawah Gamboge Prince

	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Inverlaw Doreen	R. J. Crawford, Inverlaw, Kingaroy	7,006·2	363·673	Oxford Royal Lad
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Inverlaw Mountain Daisy	R. J. Crawford, Inverlaw, Kingaroy	7,359·65	374·406	Oxford Royal Lad
Fauvic White Bait	H. Cochrane, Fauvic, Kin Kin	6,326·1	279·36	Austral Park Sheik
Oxford Mamie	E. J. Keys, Proston	5,341·75	233·642	Oxford Jovial Lad
	AYRSHIRE.			
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Myola Vinnie	R. M. Anderson, Southbrook	7,790·16	303·365	Benbecula Bonnie Willie

General Notes

Staff Changes and Appointments.

Mr. W. E. Hamley, Inspector, *Diseases in Plants Acts*, at present stationed at Wallangarra, has been appointed also an inspector under *The Apiaries Act* and *The Diseases in Stock Acts*.

Mr. K. King, Inspector, *Diseases in Plants Acts*, Coolangatta, has been appointed also an inspector under *The Diseases in Stock Acts*.

Mr. C. F. Parry-Okeden, of Auburn Station, via Chinchilla, has been appointed an honorary inspector of stock.

Mr. W. Head, Septimus, Mirani, has been appointed canegrowers' representative on the North Eton Local Sugar Cane Prices Board in place of Mr. A. Smoothy, who has resigned.

Mr. J. R. Loveless, loader for the Committee of Direction of Fruit Marketing at Burrum, has been appointed an inspector under *The Diseases in Plants Acts* in succession to Mr. I. L. Andersson.

Constable J. J. Garmester, Mt. Surprise, has been appointed also an inspector under *The Slaughtering Act*.

Transfers approved: Mr. R. D. Chester, Government Veterinary Surgeon, from Murgon to Toowoomba; Mr. O. H. Brooks, Assistant to Veterinary Surgeons, from Brisbane to Murgon.

Messrs. G. R. Moule, B.V.Sc., and L. G. Newton, B.V.Sc., Government Veterinary Surgeons, and O. H. Brooks, B.V.Sc., Assistant to Veterinary Surgeons, have been appointed also inspectors under *The Diseases in Stock Acts*, *The Dairy Produce Acts*, *The Slaughtering Act*, and *The Pig Industry Act*.

The Officer in Charge of Police, Torrens Creek, has been appointed also an acting inspector of stock.

Messrs. E. E. Prenzler and G. C. Kenny (Wynnum and Holland Park, respectively) have been appointed inspectors under *The Diseases in Stock Acts*, *The Slaughtering Act*, and *The Dairy Produce Acts*, Department of Agriculture and Stock.

Mr. R. Letters, inspector under *The Diseases in Plants Acts* has been appointed also an agent under *The Banana Industry Protection Acts* and transferred from Brisbane to Pomona.

Mr. J. H. Mitchell, agent under *The Banana Industry Protection Acts*, has been transferred from Yandina to Nambour.

Messrs. C. M. Calder, H. A. Lowe, and J. J. Shepherd, of the Queensland Main Roads Commission, have been appointed honorary rangers under *The Native Plants Protection Act*.

Sugar Experiment Stations Advisory Board.

The following have been appointed members of the Sugar Experiment Stations Advisory Board constituted under "*The Sugar Experiment Stations Acts*, 1900 *to* 1938," for the period from 1st April, 1941, to 31st March, 1944:—

Hon. F. W. Bulcock, M.L.A. (Chairman).

Dr. H. W. Kerr (Director of Sugar Experiment Stations).

Messrs. N. H. Wellard (Miallo, Mossman) and B. Foley (Childers) (Representatives of growers of sugar-cane).

J. Smith (Mackay) and A. V. Thorp (Nambour) (Representatives of manufacturers of cane sugar).

Veterinary Surgeons Board.

Messrs. E. F. E. Sunners (Chairman of the Queensland Meat Industry Board) and R. P. M. Short (Under Secretary, Department of Agriculture and Stock) have been appointed representatives of the Government on the Queensland Veterinary Surgeons Board. Dr. J. Legg (Senior Veterinary Surgeon, Animal Health Station, Yeerongpilly) and Mr. K. M. Lucas (Ascot) have been elected members of the Board, of which Professor H. R. Seddon (Director of Veterinary Services) is President.

Citrus Levy.

The Citrus Levy Regulation, which has been in force for a number of years, has been again extended for twelve months from 1st March, 1941. The levy is imposed by the Committee of Direction of Fruit Marketing under *The Fruit Marketing Organisation Acts,* and the sums raised thereby are expended in the interests of the citrus industry. The levy is made as follows:—

On all citrus sent to factories, at the rate of 5s. per ton;

On all citrus sent by rail to agents or persons other than to factories, at the rate of 1s. 7d. per ton, with a minimum of one penny; and

On all citrus sent otherwise than by rail to agents or persons, except factories, at the rate of one-halfpenny per case, with a minimum of one penny.

In Memoriam.

JOSEPH KILMARTIN.

THE death on 21st March of Mr. Joseph Kilmartin, Interviewing Officer of the Department of Agriculture and Stock, is recorded with very deep regret. The late Mr. Kilmartin was one of the best known and most popular officers of the Department by reason of his daily personal contact with every caller. He was a native of Brisbane and had attained his forty-seventh year. He entered the Public Service in 1908 as a junior officer of the Department of Home Affairs and was afterwards transferred to the Department of Agriculture and Stock. Apart from his ordinary duties, which were discharged with unfailing courtesy, innate kindliness and tact, he was greatly interested in the boy employment problem. As selection officer for the St. Lucia Boys' Farm School, he gave noticeable service during the depression and post-depression years, and many a youth owes his start in successful agriculture to Mr. Kilmartin's encouragement, and to whom he acted as guide, philosopher, and friend. He was an unobtrusive and assiduous worker for charitable and patriotic causes, and is greatly missed by all who have business with the Department he served so well. Surfing, cricket, and gardening were his chief outside interests, and as a rose-grower he excelled.

Plate 70.

A graceful tribute was paid to his memory by the Premier, Hon. W. Forgan Smith, LL.D., under whom he had served when the Premier was Minister for Agriculture and Stock. "I heard with very keen regret of the death of Mr. Kilmartin," he said. "He was a courteous, capable, intelligent, and industrious man. I offer my sincere sympathy to his relatives in their bereavement."

The late Mr. Kilmartin was laid to rest in the South Brisbane Cemetery in the presence of a large gathering of fellow officers and of representatives of the commercial life of the city, and of sporting bodies with which he had long been associated, and within sight of what was St. Lucia Farm Boys' School across the river, which he had helped to success. The Premier was represented by Mr. G. D. Lee, of the Chief Secretary's Department, and the Minister for Agriculture and Stock, Hon. F. W. Bulcock, by his Under Secretary, Mr. R. P. M. Short. Mr. J. D. O'Hagan, Under Secretary, represented the Justice Department. Mr. Kilmartin, who was unmarried, is survived by seven brothers (including Mr. Jim Kilmartin, of the Premier's Department) and three sisters, to whom deep sympathy is extended.

Answers to Correspondents

VETERINARY ADVICE.

(Selections from the outgoing mail from the office of the Director of Veterinary Services.)

Corns in Horses.

S.A. (Jimbour)—

A corn may be caused by the heel of the shoe pressing on the seat of a corn, which is at the angle formed between the wall of the hoof at the heel and the bar of the foot. This condition may arise from faulty shoeing, or by allowing the shoes to remain on too long. Another cause is a stone or piece of metal becoming wedged at the seat of corn.

Treatment—

1. The shoe should be removed and the hard dry outer horn pared away. All the diseased horn should be removed from the surface of the bruised or suppurating (festering) area, and the latter should be cleansed.
2. If the corn is suppurating (festering) adequate drainage should be provided. If this is not attended to, the pus may underrun the sole and the condition become hopeless. As this is a painful condition, it may not be possible for you to restrain the mare to do the job properly without a local anæsthetic.

If this is necessary, and the corn is suppurating, it would be advisable to obtain the services of a qualified veterinarian.

Warts.

A.J.C. (Roma)—

Regarding your two thoroughbred colts affected with warts, it is advised that you apply raw castor oil to the affected parts. Those that are pedunculated (stalk-like) could be tied off with a fine piece of thread. Arrest of the blood supply will cause them to dry off.

In some instances you may find that the warts disappear in course of time.

Poll Evil.

B.B.C. (Murphy's Creek)—

Poll evil is a swelling of a bursa over the poll—that is, the region immediately behind the ear at the uppermost part.

A bursa is a cavity filled with an oily fluid, which normally acts as a lubricating mechanism. Poll evil is usually caused by some form of irritation or to an internal infection.

In the early stages it may be treated by applying cold water continuously for two to three hours daily with a hose, and also by preventing further irritation. If a hose is not available, camphorated linament may be used as a medium for massage. If the condition is chronic—that is, long standing—it may be advisable to apply a blister and turn the animal out until the condition passes.

A blister consists of biniodide of mercury one (1) part, lard eight (8) parts. The area is clipped free of hair, and the blister rubbed in for about twenty minutes. It is allowed to remain on for about twelve hours, then the part is washed with soap and water. It is advisable to have the animal tied up during this period. At the end of the twelve hours the part will be considerably inflamed, and by this it will be seen that the blister has had the desired effect. When the inflammation subsides the poll evil will probably subside also.

It is advisable to apply vaseline around the edge of the area blistered so that the effects of the blister will be limited to that area.

A more satisfactory treatment would be carried out by a qualified veterinarian, who would apply surgical measures.

Scours in Calves.

W.S. (Woogoompah Island, Moreton Bay)—

In the treatment of scours it is advised to proceed as follows:—

1. Administer up to 2 oz. of castor oil to each calf.
2. Administer one teaspoonful of formalin in each one pint of whole milk fed. When scours appear, whole milk should be used instead of skim milk.
3. Affected calves should be isolated and the yards which have been used left open to the sun for a month or so to clean up the infection.
4. Affected calves should also be fed half a breakfastcupful of lime water at each feed. This is made by placing slaked lime in a cask and adding water. Occasionally it should be stirred and allowed to settle, and the clear fluid—lime water—is taken off and fed. As long as a slight scum forms on top of the water more water may be added to the lime, as only a certain amount of lime goes into solution.

Milk Fever.

B. J. H. (Kulgun, West Moreton)—

The history and symptoms described are typical of milk fever. This condition results from a sudden lowering of the stores of the metal calcium in the blood, which results from the cow suddenly coming into milk (comparatively large quantities of calcium being present in milk.)

When once developed, the treatment for the condition is—

1. Obtain 2 oz. of calcium borogluconate from your local chemist and dissolve it in 10 oz. (half a pint) of water.
2. The above solution should be warmed to about blood heat and injected under the skin with an ordinary pound syringe.
3. It will be readily realised that half a pint of solution is a considerable volume of fluid to inject into the skin in one place, and therefore the injection should be made in several places.

The old treatment for this condition was to pump the udder up with a bicycle pump. This treatment is quite effective, and is carried out by passing a clean teat tube up the teat duct and connecting the tube on to the pump and inflating the udder to a comfortable degree of tension. The teat tube is then removed, and after the four quarters have been pumped up the animal usually gets up within twenty to thirty minutes. This method of treatment obviously does not get to the primary cause of the disease.

By way of prevention it is necessary to—

(*a*) Feed the dry cattle a mineral supplement containing sterilized bone meal two parts, and coarse salt one part, during the time when they are turned out prior to calving. This is particularly important when the cows are experiencing drought conditions.

(*b*) Do not milk newly-calved cows immediately they have calved. It is better both for the cow and the calf to allow the calf to suck for twenty-four to forty-eight hours after it is born.

BOTANY.

Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.

Abnormality in Climber (Tecoma Mackenii).

A.S. (Bundaberg)—

Thanks for the specimen of fasciated growth in *Pandorea ricasoliana*. This beautiful climber, which is a native of South Africa, is more commonly known to nurserymen and gardeners as *Techoma Mackenii*. The peculiar abnormality you send is the result of what is known as *fasciation*, and is due to the fact that in place of one terminal bud arising a great number arise and grow thickly together, forming these strap-shaped stems. You sometimes see remarkable examples of this in the ordinary *Asparagus plumosus*. The Cockscomb (*Celosia cristata*) is a form of fasciated inflorescence which has been gradually increased by breeding. It is not known what conditions bring about this fasciation. Fasciations are most abundant in hot wet weather following a dry spell.

Rural Topics

Ensilage as Stock Feed.

Recent experiments in England have given a sharp rebuff to the belief in some quarters that ensilage is not a first-class feed for stock. Experiments in the use of grass silage at the Rowett Research Institute's Experimental Stock Farm, show that a cow can eat up to 152 lb. a day of high-quality silage and maintain an average yield of five gallons for at least two months. The silage was made from three year old pasture cut in June and made in July. A pit was dug 8 yards long by 2 feet deep and sloping to one end. The pit was filled and was covered with earth within three days. Commenting on the experiments, the farm authorities state that it has been generally considered that grass silage could not be fed to a cow at a greater rate than 80 lb. a day, whereas they have had no difficulty in getting stock to eat 150 lb. No taint in the milk has been observed.

A Poultry-Plucking Machine.

Among the novel machines on the market to-day is the chicken plucker. This unit automatically plucks the feathers of 250 to 300 birds an hour, while expert hand pickers in the poultry business can pluck about 35 to 40 chickens in this length of time. The tail and wing feathers, however, require manual attention after the machine operation. The plucker consists of one or more metal drums, each about 2½ feet in diameter. Rubber tube fingers line each drum, making a cylindrical brush. As the drum revolves rapidly it brushes off the feathers.—"*New Zealand Farmer's Weekly.*"

A Rubber-Producing Shrub.

After nine years of research and experimentation it is reported that success has been achieved in the cultivation in California (U.S.A.) of the guayule, a rubber producing shrub. This plant is native to Mexico and Texas and yields a return four years after planting. The entire plant is ploughed up at harvest and crushed under water, when the rubber content is washed free and floats to the surface, where it is skimmed off. A plantation of one acre, it is calculated, will yield a sufficiency of plants to produce 1,800 lb. of rubber. The plant is said to thrive in relatively desert and dry regions and calls for only a minimum of supervision.

Success of Tuberculin Tests.

The United States Department of Agriculture has announced that the whole of that country is now practically free of bovine tuberculosis, the degree of infection having been reduced to less than one half per cent. This is the culmination of the vision of many prominent veterinarians who, in 1917, believed the task of tuberculin testing of millions of cattle to be feasible, in spite of many doubts and much opposition. Actually, the huge enterprise in the course of the 23 years involved more than 232,000,000 tuberculin tests and retests. About 4,000,000 tuberculous cattle were detected and removed for slaughter.

Sheep Fed from the Air.

Marooned on a 400-acre island in one of the channels of the Bulloo River, near Cunnamulla, during the recent floods, 5,200 sheep were fed with 5 tons of maize landed by three aeroplanes. The sheep were owned by the Elsinora Pastoral Co., and it was found impossible to remove them to higher land or get feed to them by land. At the suggestion of Mr. Colin Young, three privately-owned passenger aeroplanes were converted to carry freight and they landed successfully on an improvised landing ground 60 feet wide and 225 yards long. The fodder was carried by air from Cunnamulla and the machines covered 174 miles.

For Grain and Grass.

A palatable and nourishing perennial plant that is both grain and grass is said to have been successfully evolved at the University of Idaho, U.S.A. This was achieved by crossing common wild rye grass and red winter wheat. The plant is said to have the drought-resisting qualities of the rye grass, together with the palatability and high seed production of the wheat plant.

A Rubber "Persuader" in the Trucking Yard.

To avoid injuring or bruising cattle in trucking yards, one beef buyer does all his urging when trucking stock with a whip made of an old motor tyre tube. The tube is cut in sections lengthwise and mounted on a wooden handle. When the rubber whip is slapped on a beast it makes a loud report which startles the animal and produces the same effect as a painful blow. Investigation of slaughtered cattle has shown no bruise or injury to the carcase through the use of this effective yet gentle rubber "persuader."

It seems a sound idea, for the use of a rubber slapper like that would do away with a lot of unnecessary bruising which depreciates the value of a carcase. In fact, bruising of beef on the hoof means a substantial reduction of the value of beef on the hook. There is apparently no reason why such a harmless rubber slapper should not come into general use.

"Sweet-Buck" Syrup.

Two American science workers have succeeded in producing a marketable sweet syrup from sweet potatoes. Sweet potatoes are rated as the second most important vegetable crop growing in the United States; yet only about 70 per cent. of the production is marketed. The remainder are potatoes which have the same composition and quality as the marketable ones, but are larger than buyers will accept. Very little or no use is made of these oversized "sweet bucks," and they represent a considerable loss to the grower.

If the new discovery can be applied in practice by the formation of a sweet potato by-products industry, growers would benefit considerably who would then have a market for the portion of the crop which is now wasted.

A Novel Stock Feeding Scheme.

An interesting method of fodder conservation and stock feeding is practised by a North Dorrigo (N.S.W.) farmer. Hay, containing red clover, rye, and lucerne, is cut in the usual way and stacked in the paddocks in which it is grown, each stack holding about 5 tons. While the stack is being built, 8 to 10 lb. of salt to the ton is scattered over the hay to keep it soft and palatable. The retention of moisture, too, keeps it fairly free from dust. The mown hay is gathered with a horse-drawn sweep and pulled to the stack, the horse, as the stack gets higher, passing over it, tipping the sweep at the top as it does so and consolidating the hay by trampling it down. In building the stack, a batter is provided on both sides for the going up and the going down of the horse, but both batters are removed when the stack is topped, and so leaving the stack with a good finish.

The hay is protected from stock until it is required in the autumn, when the cattle are grazed in the paddocks and given free access to the stacks. There is practically no waste. Large stacks have proved unsuitable, because, when high, the lower portion is eaten out leaving the top overhanging.

Although seventy head of cattle have free access to the hay they never over-eat, no case of sickness from this cause ever having occurred on the farm.

Ploughing Matches Replace Shows.

In some farming districts in England the annual shows have been abandoned in favour of ploughing matches while the war is on. It is held that ploughing contests would have greater war time value, while still remaining a means of maintaining interest in local show societies.

The Democratic Cow.

Talk about constitutional rights! Cows in England, at least, can do just about what they like. No worrying about stop lights or parking tickets, or being strafed by traffic cops. The High Court of Appeal in England held recently that a cow had the constitutional right to stand in the middle of the road and chew her cud and let traffic go hang—or roundabout. At least, the Court said that cows do not move in straight lines (they certainly don't, especially on the road home from shire council meetings!), and no driver could be expected to make them go in straight lines or stay out of the road.

The decision was made in a case where a motorist had collided with a cow and claimed damages to his car. In announcing his decision, the judge said that cows have "strayed about the road for time immemorial" and will probably continue to do so.

To those of us who have to travel country roads where local farmers turn their cows into the "long paddock" at night, that's what might be called a "cow" of a decision!

Farm Notes

MAY.

WHEN seasonal conditions permit, May sowing of wheat is recommended in the Maranoa and Central districts, where early-sown crops invariably outyield those established later in the season.

For the main Downs sowing, June is preferred (unless sheep are available to check the early growth), as the principal varieties now grown, Flora, Florence, Pusa, Three Seas, Seafoam, and Gluyas, are all sufficiently quick maturing for early sowings to risk damage by frost. All seed wheat should be graded and treated with copper carbonate or a reliable mercury dust as a preventive of ball smut, utilising 1 to 2 oz. per bushel. Seed barley and oats are preferably treated with formalin, or with either of the mercury dusts agrosan and ceresan.

Succession sowings of oats, barley, or wheat required for grazing may be made during the month, with a mixture of field pea seed or tares, as described in previous issues of this Journal

Winter grasses should now be well established. Land now in good condition may still be sown with suitable types, preferably *Phalaris tuberosa*, Wimmera rye, or prairie grass, all of which will withstand fairly dry conditions. Sowings later than May are not recommended.

Lucerne sowings may be continued, drilling the seed to a shallow depth only, on soil containing enough moisture for satisfactory germination. Rolling is beneficial if the surface is somewhat loose and rough, but should be followed by a light harrowing.

Potatoes will have received their final cultivation and hilling, so that cultivators may now be diverted to root crops, such as mangolds and swede turnips grown for pig feed.

The sowing of onion seed may be continued on suitable soils, drilling in their permanent position, in rows spaced from 12 to 15 inches apart, and with a covering of not more than ½ inch of soil. Hand seeders are useful for this work, if the areas are not large.

Mature sweet potatoes may be dug, allowed to dry in the sun for a few hours, and if desired for home use placed in dry sand until required. Sweet potatoes are mature when the cut surface dries white and does not turn greenish black round the edge.

Attention should be given to the importarnt work of seed selection for future sowings before finalising the harvesting of maize, sorghum, sudan grass, cowpea, pumpkins, &c., as it is wise to be sure of varietal purity rather than depend on the seedsman from year to year.

THE USEFUL CORRIEDALE.

That the useful Corriedale breed of sheep can go on doing the job of providing good heavy fleeces and keeping its price up, even when times are bad and drought conditions prevail is shown by the experience of a New South Wales sheepman. Here is what he says:—

"During the last five years, which include two droughty years (1937 and 1938), the Corriedales, without any wethers, have averaged 12½ lb. of wool a head, the studs averaging nearly 14 lb. Last year's shearing: 5,000 flock Corriedale ewes and ewe hoggetts, no wethers, cut 44 bales a thousand sheep, averaging 13½ lb. a sheep. Approximately 1,200 sheep, including cull ewe hoggetts, and breeding ewes up to 12 years old—the breeders carrying 95 per cent. of lambs—averaged more than 14½ lb. During the height of the dry time the cast for age flock ewes—5 years old—sold at public auction at 29s., the whole drop of wether lambs sold at the same auction for 27s. These lambs were 5 months old and shorn in the previous November."

Orchard Notes

MAY.

SUCCESS in fruitgrowing depends not only on the proper working and management of the orchard, but also on the way in which fruit is handled and marketed. With citrus fruit particularly, none pay better for extra care in packing and presentation.

Some growers do not realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions.

To prevent injury to the skin when gathering, all fruit should be cut and not pulled. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. If, however, the injury is only slight it may be sent to a local market for quick sale.

For interstate markets, only choice fruit should be selected. It should be graded for size, colour, and quality and properly packed, only one grade of fruit being packed in a case.

All orchards, vineyards, and plantations not completely clean should receive immediate attention.

Banana and pineapple plantations should be put into good order and kept free from weed growth.

Land to be planted with fruit trees should be got ready, for it is always advisable, if possible, to allow newly-cleared land to "sweeten" before planting.

APPLES AS STOCK FEED.

In New Zealand apples which, although good eating, are marred by some outside blemish which makes them unfit for marketing are usually delivered to dairy farms for cow and pig feeding. It is said that where fed to pigs apples should be in combination with meal or ground barley, and it is a good plan to balance them with bran (if obtainable) for cow-feeding.

When apple feeding for pigs was first tried out, some farmers put their pigs on to a straight diet of skim milk and apples, and found that they scoured on it. To give the best results, apples should be combined with a concentrate of some kind.

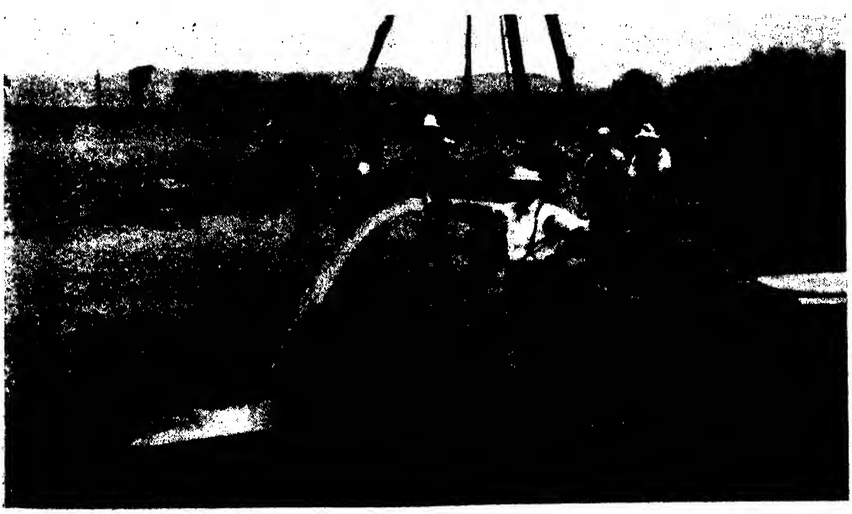
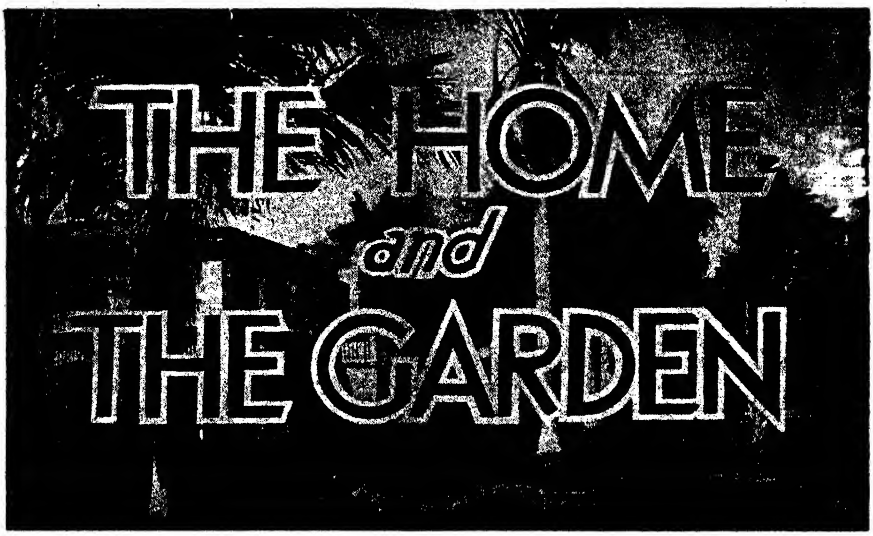


Plate 71.

Not a "Gusher," But Nearly as Good.—New well on a cotton farm in the Callide Valley.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH—NATION'S WEALTH.

This month we have a birthday! It is exactly twenty-three years ago since our Maternal and Child Welfare Centres (Baby Clinics) were established in Queensland, and we think it appropriate that the occasion should be marked by a birthday present—not to ourselves, but to our country mothers. That is why we have established a new branch of our service which has been designed especially to meet the needs of mothers who live in the country and cannot attend the centres—namely a Correspondence Section. Let us explain to you how it can help.

CORRESPONDENCE SECTION—ITS AIMS.

Firstly, we want to get into contact not only with mothers living in districts in which welfare centres have been established, but with *every mother in the State.* In this, as in all the other branches of our service, our object is to keep mothers and babies fit and well.

After the district registrar has notified the birth of a child whose mother lives outside the district in which a welfare centre is established, the sister in charge of the correspondence section will be informed. A letter from the Medical Director will then be sent out to the mother, and she will be told that she can obtain advice about the feeding, care and management of her baby just by writing a letter addressed simply, "Baby Cinic, Brisbane." The letter need not even be stamped, because arrangements have been made with the Post Office by which the Department of Health and Home Affairs will undertake the cost of the postage. In the same way, mothers may obtain copies of either of our books, "The Expectant Mother" or "Care of Mother and Child." The books are free of charge, and all that country mothers have to do is to address letters "Baby Clinic, Brisbane," as explained before, and the book requested will be forwarded. Once having written to us, we feel sure that mothers will wish to make it a regular practice, because this is to be a really personal service, and we shall want to have reports as to when baby sits up and cuts his first tooth, and so on, and, of course, we wish to continue

helping with advice about diet and other matters, until baby is five years of age and not a baby any more, but a school boy or girl who will then come under the care of the school medical service. The kind of food baby gets during the first five years is so tremendously important because his body is built up and nourished by the food he eats, and it is impossible to build up strong bones and muscles and good, well-spaced teeth with the wrong kinds of food, just as one cannot build anything that is beautiful and lasting with poor materials.

We look after the children who attend our centres until they are five, and we want to do exactly the same with our "correspondence babies." We wish to point out that, although you may have our book to refer to, no two babies are alike, and so every baby needs individual care and attention. This our Correspondence Sister can give you, because she has had experience of all kinds of babies in the different centres, and if country mothers will explain to her carefully just how this particular baby is behaving, Sister will know how to advise. The service is under the personal direction of the Medical Director. Remember that the Correspondence Service has been established in order to help mothers who are living in districts where a welfare centre (baby clinic) has not so far been opened. It is not for those mothers who are able to attend the centres, because advice obtained in a personal interview is naturally of greater value than that obtained in a letter. In our Correspondence Section, however, we shall aim at obtaining as intimate a knowledge as possible of each mother and her child. Country mothers are invited to ask for any kind of information, and if we cannot supply it ourselves, we will put them in touch with the person or department best qualified to help. Please tell all your country friends about this new service, and help us to make it a great success. If you do, we will feel that our twenty-third birthday anniversary has been a very important one indeed. For the benefit of those mothers who do not know about our maternal and child welfare work, we shall go back to the time when our work began.

Development of the Maternal and Child Welfare Service.

In March, 1918, four child welfare centres were opened in Brisbane. To-day, there are 145 centres spread over the State—along the coast from Coolangatta in the South to Mossman in the North, in the interior from Cunnamulla in the South-west to Mt. Isa in the North-west, and along all the railway lines running inland from the coast.

Reduction of Infant Mortality.

During the years from 1918 until now, deaths of infants aged one month and under one year, the age at which the child welfare service exerts its greatest influence, have been reduced to one-third. *This represents the saving of the lives of about* 400 *babies every year.*

Ante-natal Care.

Another important aspect of our work is that of advising expectant mothers regarding their health. The nurse cannot take the place of the doctor, but in regard to diet and other matters relating to antenatal care, she is well qualified to advise mothers. In short, the aim of the service is to render motherhood safe, and to give the children the best possible start in life, namely, good health. Country mothers may also obtain patterns of baby clothing through our Correspondence Service.

Babies are Individuals.

In criticism of child welfare work, it has been stated that welfare nurses attempt to treat every baby alike, in other words to make all babies conform to a certain fixed standard of feeding and management. This is very far from the case. No one knows better than a child welfare nurse who is dealing with thousands of babies a year that no baby is quite like any other baby, and the aim of our service is always to consider each child as an individual. A mother who lives in a district where a maternal and child welfare centre is established is indeed a privileged person, and it would be surprising if she did not avail herself of a valuable health service which is freely offered. In order to receive the full benefit of the service, she must be regular in her attendance.

Co-operation of Fathers.

In connection with our Correspondence Service, as also in the ordinary work of our centres, we would appreciate the active co-operation of our fathers. Too often the problems associated with the care and general management of children are left entirely to our mothers. We want the fathers to realise that we cannot do our best work without this interest and support. Not only would we like them

to read our books and write to us and ask their own questions and present their own points of view and their own difficulties, but we would like them to talk to others about the work of the Maternal and Child Welfare Service, and particularly about its Correspondence Service. In districts in which child welfare centres have been established, fathers might form clubs and invite the sister in charge to tell them about the work. Next month we shall discuss a most important subject—the care of baby's feet.

IN THE FARM KITCHEN.

FRUIT ON THE MENU.

Passion Fruit Flummery.

Place 2 cups water in a saucepan with ½ cup lemon juice and 2 dessertspoons gelatine and allow to soak until gelatine is soft. Add 1 cup sugar and bring to boiling point. Mix 1 tablespoon plain flour with a little of the water until smooth, and add to liquid and stir until mixture boils. Continue to boil for a few minutes, then allow to cool. Beat until quite frothy and add ½ cup passionfruit pulp. Fill mould and set in ice chest.

Baked Apple Savoy.

Put a little marmalade in the bottom of a well-buttered fireproof dish. Cut 4 slices of brown bread about ½ inch thick, then cut into dice. Place these on top of marmalade. Beat 2 egg yolks slightly, add 1 tablespoon sugar, 1 pint milk, and a little vanilla. Pour over bread and allow to stand for about half an hour. Place in a pan of water and bake until almost set. Spread top with a little more marmalade and cover top with peeled, cored, and sliced apples. Sprinkle with brown sugar and a little cinnamon, dot with butter, and continue baking until apples are cooked. Serve cold.

Apple Surprise.

Wash ½ cup rice well and bring to boil in 1 cup water. Drain off water and add 1 pint milk, the rind of half a lemon, and 1 tablespoon sugar. Simmer until rice is tender, then add 1 dessertspoon butter. Continue to cook until moisture is absorbed. Press a thick layer in the bottom of a well-greased fireproof dish and place in 3 or 4 pared and cored apples with the cavities filled with raisins, dates, or sultanas and a dot of butter. Fill the dish with the rice, spreading it evenly over the apples. Cover with a greased paper and bake in moderate oven for about half an hour. Put ½ cup brown sugar in a saucepan with 1 tablespoon top milk, 1 heaped tablespoon butter, and ½ level teaspoon ground cinnamon. Boil until syrup is formed (about five minutes), pour over apples, &c., and bake for another half an hour. Serve hot or cold.

Pear Hedgehogs.

Peel and halve fairly large ripe dessert pears and cook in a covered casserole with as little water as possible, and using 1 cup sugar to 6 pears. Add ½ slice of lemon and a little stick cinnamon. Remove pears from syrup and allow to get quite cold. Mix ½ cup cake crumbs with a little sherry or rum, add 1 tablespoon chopped walnuts or almonds, and form into a paste. Fill cavities and join pears together with a toothpick. Whip ½ pint cream, adding a little sugar and enough cochineal to colour a delicate pink. Cover pears with this, then roll in cornflakes. Place in ice chest until thoroughly chilled and serve with sponge fingers. An excellent dish to serve with ice cream.

Cherry Meringue.

Take 1 tin cherries, 2 eggs, ½ lb. short pastry, few chopped nuts, 1 dessertspoon castor sugar. Roll out the pastry and line a greased baking or sandwich tin. Cut out a round of greaseproof paper and put on top of the pastry, filling with rice or beans to keep it flat whilst baking. Bake in a fairly hot oven for twenty minutes. Then remove the beans and paper, brush over with white of egg and return to the oven for a further five or six minutes. When cold, fill with the cherries. Thicken a little of the syrup by stirring over low heat with the two egg-yolks. Allow to get cool and then pour over the cherries. Whip up the whites of eggs until stiff, fold in the castor sugar, pipe in whirls over the fruit, sprinkle with a few chopped nuts and return to an oven of much lower temperature to get firm and lightly brown. Serve hot, garnished with a few cherries, or it is equally delicious as a cold sweet.

Honey Tapioca.

Take 1 pint milk, 2 eggs, 2 tablespoons honey, 3 oz. sultanas, 2 tablespoons tapioca, 1 gill thin cream. Put the milk into a saucepan and bring to the boil. Sprinkle in the tapioca and simmer for thirty minutes. Remove from the stove and allow to cool a little. Beat the yolks of eggs and stir into the tapioca. Return to the stove and continue stirring until the mixture thickens. Add the honey and the sultanas and turn into a large basin. When cool, stir in cream, whip the whites of eggs until stiff and fold into the mixture. Divide into individual glass dishes and decorate with a fresh raspberry (or glace cherry) and strips of angelica. For special party occasions whip double cream until thick and pipe little rosettes on top of each dish.

Orange Wafer Gateau.

Prepare and cook wafers as follows:—Cream ½ cup butter well, gradually add ¾ cup sugar and beat until very light. Add 1 unbeaten egg and beat well. Sift together 1½ cups flour, 1 teaspoon baking powder, 3 tablespoons cornflour, add the grated rind of 1 orange, and add it alternately to butter mixture with ¼ cup milk and ¼ cup orange juice. Mix well and spread a small quantity on an inverted well greased and floured sandwich tin. Do not spread too near the edge, as the batter will run down the sides during the baking and spoil the look of the wafer. These wafers may be baked on a greased and lightly-floured oven slide and a round traced out the size of a sandwich tin. Bake in a moderate oven for about 10 minutes or until a golden brown. Turn wafer on to a cooler and continue to cook batter. Join layers with the following: Put 1 cup orange juice in a saucepan with 2 tablespoons lemon juice, ½ cup sugar, and 1 cup water. Bring to boiling point and add 2 tablespoons cornflour diluted with a little of the juice or water. Stir over gas until thick and quite clear. Remove from stove, beat in 1 egg-yolk, and 1 dessertspoon butter, a little at a time, then allow to cool. Spread a little on top of last layer and sprinkle with chopped walnuts or almonds. The wafers may be filled with ice cream and chopped fruit, which makes a delicious party sweet.

Orange Pie.

Line a sandwich tin or fireproof tart plate with the following: Cream 3 oz. butter well, gradually add 2 oz. sugar and beat well until creamy. Beat 1 egg and add 2 tablespoons milk, add gradually to butter mixture, then stir in 6 oz. plain flour sifted with 1½ teaspoons baking powder and a pinch of salt. Add 4oz. wheatmeal and form into a paste. Use as directed and bake in hot oven for about twenty minutes. In the meantime prepare filling. Mix ½ cup plain flour with enough cold water to form a smooth paste, then add ¾ cup sugar and beat well. In a saucepan put 1¼ cups boiling water, add diluted flour and stir into boiling water. Simmer for ten minutes, stirring now and again. Remove from gas and add 3 well-beaten egg-yolks, the grated rind of 1 orange, and the juice of 2 oranges. Cook without boiling for 5 minutes. Beat the egg-whites until stiff, gradually add ½ cup castor sugar and fold one-third into orange mixture. Fill prepared pastry case and pile the remainder on top rather roughly. Bake in a slow oven until set and a nice pale fawn colour.

Mixed Fruit Fritters.

This is a good way to use up oddments. Chop fruit in the same way as you would for fruit salad. Add enough good frying batter to bind fruit together. Add sugar to taste and a little lemon juice. Melt a little butter in a fry pan, add spoonfuls of the mixture, and flatten out a little. Cook over a moderate heat until well browned underneath, then turn and brown the other side. Dish up and sprinkle with castor sugar and serve.

Savoury Egg-Plant.

Peel 3 or 4 onions and fry in a little butter until soft, but not brown. Add 1 finely-chopped green pepper and cook a little longer. Meantime, place 1 large egg-plant in boiling water and cook for about 5 or 6 minutes. Remove skin and cut into slices, then into fairly large dice-shaped pieces. Add this to onion mixture and cook for about 15 minutes, keeping it stirred so mixture will not burn. Lastly, add 6 medium-sized tomatoes, peeled and cut in four, add pepper and salt to taste, and continue to cook for about another 10 minutes. Place in a fireproof dish, sprinkle with breadcrumbs, dot with a little butter, and bake in a moderate oven for about thirty minutes.

ASTRONOMICAL DATA FOR QUEENSLAND

MAY, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON. AT WARWICK.

May.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
	a.m.	p.m.	a.m.	p.m.
1	6.17	5.21	9.54	8.55
2	6.18	5.20	10.42	9.47
3	6.19	5.19	11.29	10.41
			p.m.	
4	6.19	5.19	12.13	11.37
5	6.20	5.18	12.57	nil
				a.m.
6	6.20	5.17	1.40	12.36
7	6.21	5.17	2.22	1.36
8	6.21	5.15	3.6	2.39
9	6.22	5.14	3.51	3.44
10	6.22	5.14	4.38	4.50
11	6.23	5.13	5.29	5.57
12	6.24	5.13	6.23	7.4
13	6.25	5.12	7.20	8.10
14	6.25	5.12	8.20	9.11
15	6.25	5.12	9.20	10.7
16	6.25	5.10	10.18	10.58
17	6.26	5.10	11.14	11.43
				p.m.
18	6.27	5.10	nil	12.24
			a.m.	
19	6.28	5.10	12.9	1.2
20	6.28	5.9	1.3	1.38
21	6.29	5.8	1.55	2.13
22	6.29	5.8	2.46	2.48
23	6.30	5.8	3.36	3.23
24	6.31	5.8	4.27	3.59
25	6.31	5.7	5.18	4.38
26	6.31	5.6	6.10	5.20
27	6.32	5.6	7.0	6.5
28	6.32	5.6	7.51	6.52
29	6.33	5.6	8.41	7.43
30	6.33	5.5	9.28	8.36
31	6·34	5·5	10·13	9·32

Phases of the Moon.

4th May, First Quarter, 10.49 p.m.
11th „ Full Moon, 3.15 p.m.
18th „ Last Quarter, 11.17 a.m.
26th „ New Moon, 3.18 p.m.

WORLDS BEYOND THE SUN.

THERE is a dearth of planets in the night sky this month, Mars alone being visible. The little planet Mercury, which is the nearest world to the sun, will be passing far beyond the luminary on 6th May. Therefore, this planet will not be visible until it appears on the other side of the sun, toward the end of the month, when it will be showing above the western horizon in the constellation of Gemini, setting about 6.30 o'clock.

Jupiter and Saturn, which have afforded so much interest for many months, are both too near the sun to be seen, Saturn passes on the far side of the sun on 9th May and Jupiter ten days later. In a few weeks both these planets will become morning stars. It will then be noted how Jupiter is moving with ever-widening distance to the eastwards of Saturn.

Venus, which was the brilliant Morning Star since last midwinter, has now passed the sun and become the Evening Star. As yet, however, it is too near the sun to be seen, but in a few weeks it will surprise us by shining brightly above the haze of the western horizon at dusk. At the end of May the Evening Star will not set until a quarter to 7 o'clock.

THE RED PLANET.

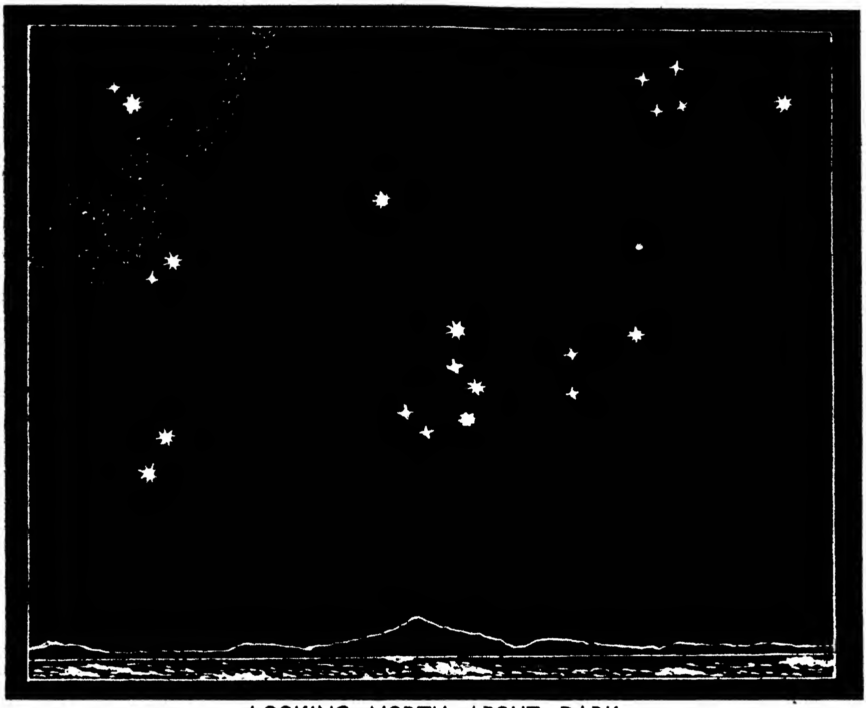
The only planet visible at the present time is Mars, the planet of so much romance, which rises a little after mid-night. Before dawn it is well up, shining with its well-known ruddy glow in the constellation of Capricornus, the Sea-goat. On 18th May, the moon, being in her last quarter, rises about mid-night, and Mars may be seen a little to the south of her—quite the brightest "star" in that rather dark part of the sky. The orbit of Mars is much more eccentric than the Earth's orbit so that at some oppositions the planet is considerably nearer to us than at others. These favourable oppositions always occur toward the end of August, for it is then that Mars is at its nearest to the sun. On 23rd August, 1924, there was a very close approach indeed, the earth passing Mars at a distance of 34,600,000 miles. At the last opposition which was on 23rd July, 1939, the planet was a little less than 36,000,000 miles away. At the next opposition, which will be in October, we shall be 38,000,000 miles from Mars; the opposition of 1939 being the most favourable since 1924. Taking advantage of these near approaches, astronomers go to a great deal of trouble to wrest a few more secrets from the Red Planet. Mars is the only planet, excepting the earth, which is not eternally enshrouded with dense clouds. Its solid surface can, therefore, be studied. With the growth of giant telescopes more and more markings are being seen, the most conspicuous, perhaps, being the polar caps which are probably composed of snow. These expand in the Martian winter and contract as the summer advances, sometimes disappearing altogether.

SPRINGTIME ON MARS.

In 1935 spring must have been early in the Martian southern hemisphere for the south polar cap began to melt unusually early. The snow cap had retreated as far as latitude 85 degrees south, a month earlier than in 1918, and two months earlier than in 1920. There were also large areas of cloud in some regions, which blotted out the surface markings over which they drifted. Mars is a most tantalizing object, because, with large telescopes, much detail can be seen and seasonal changes seem to take place, but as yet most of it is just beyond our ken, which makes us long to know more about our neighbouring world.

The remaining planets are always beyond our naked eye-sight. Uranus, like most of the others this month, is near the sun and will be passing beyond it on 17th May. Neptune is still near Beta in the constellation of the Virgin as was shown in the March journal. Being so far from the sun he appears to move through the heavens very slowly.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.



LOOKING NORTH ABOUT DARK.

IN the centre of the picture, just above the mountain peak, is the Sickle, which with the three stars to the right, or east, forms the constellation of the Lion. The stars in the forepart of Leo make a wonderfully well-formed sickle, hanging upside down in our southern skies, but in the northern hemisphere, where the forty-eight ancient constellations were devised, the sickle is upright, forming a conspicuous and rather arresting starry figure. Leo is the most famous of the zodiacal constellations. This distinction is due, probably, to the fact that when the ancient constellations were devised—perhaps nearly 5,000 years ago—the sun was in this constellation at the summer solstice. It may be that as the Lord, or King, of day was in Leo at midsummer, the brightest star was called "Little King," or, as we call it, Regulus. Regulus is a bluish-white star of tremendously high temperature, which gives it a luminosity of seventy times greater than our sun. However, its light rays, travelling 186,000 miles every second, has taken over seventeen years to reach us, and for that reason Regulus appears as a star barely of the first magnitude. The second brightest star in the Sickle is Gamma Leonis, whose colour contrasts strongly with Regulus. In a telescope Gamma is seen to be double—in fact, there is a third rather faint companion star.

HYDRA, THE WATER SNAKE.

If a line is drawn from Gamma to Regulus and continued, the chief star in Hydra, the Water Snake, is reached. This is a second-magnitude star, somewhat orange-coloured, known as Alphard, the "Solitary," as it is alone in a rather dark region. Alphard is sometimes called Cor Hydræ, the "Heart of the Water Snake." This is one of the ancient constellations and the longest in the heavens, extending, roughly, from west to east for 100 degrees. It is, perhaps, the darkest also, for all the stars excepting Alphard are small. Its dark, sinister, writhing form stretches from near the bright star Procyon, near the lower edge of the Milky Way, through Alphard, below Corvus, the four stars near the top right-hand corner, and on into the next constellation, Libra, which is well beyond the picture. Procyon and the small stars near it are the only two bright stars in Orion's dog, Canis Minor. The smaller star is sometimes called Gomeisa, the "Dim-eyed." It has been suggested that the name may be a corruption of the Arabic word "Al Ganus," the "Puppy," which would be very appropriate.

Across the Milky Way from Procyon is the brightest star in the heavens, Sirius, the great Dog Star; it is the chief star of Orion's greatest dog, Canis Major. Sirius is a most beautiful white, sparkling star, and on clear, cold nights its scintillations are wonderful. For long it was thought that Sirius must have a large dark companion, which would explain its otherwise unaccountable movements. When a large telescope was being tested some years ago, this companion was seen for the first time. Instead of being large and dark, as was expected, it was exceedingly bright and extremely small. For so small a body to have sufficient attractive force to sway Sirius, with a diameter of nearly 2,000,000 miles, it must be of enormous mass.

A TON IN A NUTSHELL.

It has been calculated that a piece of this White Dwarf, as these little stars are now called, as large as a walnut, would weigh a ton. Recently it was found that Procyon had a White Dwarf companion also, and its mass is even greater than that of the Sirian dwarf. The two bright stars below Procyon are Castor and Pollux, in Gemini. The higher one is Pollux. In the top right-hand corner are four third-magnitude stars forming a foursided figure; this is Corvus, the "Crow." The short side of the figure points to the bright white star Spica in the Virgin. The small dot half-way between Corvus and the Lion's tail, shows where Neptune is at the present time.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of February in the Agricultural Districts, together with Total Rainfall during 1941 and 1940, for Comparison.

Divisions and Stations.	Average Rainfall. Feb.	Average Rainfall. No. of years' records.	Total Rainfall. Feb., 1941.	Total Rainfall. Feb., 1940.
	In.		In.	In.
North Coast.				
Atherton	11·38	40	10·31	17·10
Cairns	16·15	59	30·98	17·11
Cardwell	17·08	69	9·47	22·39
Cooktown	13·74	65	17·67	7·62
Herberton	8·52	55	7·74	20·52
Ingham	16·97	49	19·21	29·22
Innisfail	22·93	60	35·34	17·87
Mossman Mill	19·16	28	30·88	18·67
Townsville	10·95	24	5·91	28·75
Central Coast.				
Ayr	9·58	54	2·85	20·87
Bowen	9·01	70	3·30	25·10
Charters Towers	4·63	59	5·24	12·28
Mackay P.O.	12·16	70	6·81	37·20
Mackay Sugar Experiment Station	11·90	44	6·87	38·62
Proserpine	13·71	38	9·25	43·60
St. Lawrence	6·47	70	8·26	11·38
South Coast.				
Biggenden	4·19	42	1·21	2·58
Bundaberg	6·41	58	3·00	9·02
Brisbane	6·30	89	1·59	7·98
Caboolture	7·76	65	3·44	7·87
Childers	6·48	46	3·88	5·54
Crohamhurst	12·37	48	7·74	10·51
Esk	5·28	54	0·68	6·87

Divisions and Stations.	Average Rainfall. Feb.	Average Rainfall. No. of years' records.	Total Rainfall. Feb., 1941.	Total Rainfall. Feb., 1940.
	In.		In.	In.
South Coast—contd.				
Gatton College	3·40	42	1·76	5·10
Gayndah	4·17	70	1·43	7·40
Gympie	6·62	71	3·05	4·65
Kilkivan	4·95	60	0·90	5·80
Maryborough	6·67	70	5·09	7·24
Nambour	9·52	45	6·33	13·88
Nanango	3·95	59	1·00	5·05
Rockhampton	7·64	70	2·26	11·81
Woodford	8·15	54	2·49	5·96
Central Highlands.				
Clermont	4·26	70	5·56	12·45
Gindie	2·79	42	..	7·10
Springsure	3·82	72	1·09	8·60
Darling Downs.				
Dalby	2·79	71	2·35	5·27
Emu Vale	2·53	45	1·35	6·14
Hermitage	2·39	35	..	4·96
Jimbour	2·69	62	2·45	5·88
Miles	2·69	56	1·69	7·14
Stanthorpe	3·14	68	2·11	6·72
Toowoomba	4·43	69	2·43	5·21
Warwick	3·01	76	1·39	5·46
Maranoa.				
Bungeworgorai	2·32	27	..	8·04
Roma	2·92	67	..	8·62

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—FEBRUARY, 1941.

Compiled from Telegraphic Reports.

Divisions and Stations.	Mean Atmospheric Pressure. at 9 a.m.	Shade Temperature. Means. Max.	Shade Temperature. Means. Min.	Shade Temperature. Extremes. Max.	Shade Temperature. Extremes. Date.	Shade Temperature. Extremes. Min.	Shade Temperature. Extremes. Date.	Rainfall. Total.	Rainfall. Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Coastal.									
Cooktown	..	86	75	92	12	71	5	1,767	21
Herberton	..	78	64	86	10	59	7, 8, 9,	774	19
Rockhampton	29·95	87	72	96	7	67	19	226	12
Brisbane	30·05	82	68	90	7	64	16	159	13
Darling Downs.									
Dalby	..	85	62	96	26	54	14	235	3
Stanthorpe	..	78	58	90	25	51	13	211	7
Toowoomba	..	75	60	84	12	53	13	243	10
Mid-Interior.									
Georgetown	29·87	92	71	96	25, 28	65	27	401	8
Longreach	29·94	94	69	101	13	63	14, 18, 21	109	4
Mitchell	30·00	87	61	95	11, 25	48	13	..	..
Western.									
Burketown	..	91	76	98	10	71	9	614	10
Boulia	29·89	100	74	107	11	67	4	..	..
Thargomindah	29·96	94	71	101	10, 24	62	27	..	..

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies **Five Shillings, including postage** General Public, **Ten Shillings**, including postage

Vol LV | 1 MAY, 1941 | Part 5

Event and Comment

Anzac

THROUGHOUT the Commonwealth the 26th anniversary of the Gallipoli Landing was commemorated on 25th April with more than customary solemnity, because of the fact that Australian and New Zealand troops were again fighting shoulder to shoulder on classic ground only a few miles across the Aegean Sea from Anzac Cove, where the old Diggers of the expeditionary forces of both dominions established a great tradition and set for all time a standard for succeeding generations—a standard maintained with added lustre by the Diggers of to-day, true chips off the old block, who are fighting in the same great cause of human freedom Between the Old A I F and the New it would be idle to make comparisons, for each is complementary to the other, each a purely voluntary force imbued with the same motives, impelled by the same urge to do a tough job because it has to be done and done well, and each inspired by those things of which our nation has been built To the Old A.I.F has been allotted a definite place in military history as "the army of the world's most democratic nation," and the New A I F. is living up to a splendid tradition in a splendid way

Whatever may have been said of Gallipoli as the grave of a great hope, it remains a lasting memorial of British grit Cruttwell, the eminent military historian who is not given to the use of superlatives, describes 25th April, 1915, as "the most dramatic day in the whole world

war." "That landing at Anzac Cove—the Australians' and New Zealanders' first military stroke in the war—was," says the historian, "an operation so brilliant in character that, no matter the honours gained in later battles this one could not be dimmed by comparison. Anzac proved the Australians and New Zealanders as front line soldiers." To the name of Anzac the Diggers of another generation have already added fresh laurels and, perhaps, carried its fame to even loftier heights. Every day of last month brought its thrilling story and "even the ranks of Tuscany could scare forbear a cheer."

By observers of other countries, the new Anzac Army has already been designated the finest fighting force that has ever faced a ruthless enemy of overwhelming numbers.

So on Anzac Day, while remembering, with reverence, the sacrifice and the service and, with pride, the achievements of the Old Battalions, Australia again rang with cheers for the New Battalions fighting in the old, the Australian way to which the records of friend and foe alike bear glowing tribute.

Irrigation Plants for Cotton.

THERE is now an increasing necessity of producing more cotton and to do this the Queensland Government is making available very liberal assistance for the purchase of irrigation plants for the growing of cotton and other crops.

It has been demonstrated that cotton can be grown successfully by irrigation. The principal difficulty to be overcome is late planting which is caused by the absence of sufficient winter rains to ensure enough moisture for germination of the seed. If cotton is planted between mid-September and mid-October it has been found to produce a better crop than if planted later in the year. By irrigation a pre-planting watering can, if necessary, be given and early planting then gone on with, irrespective of the rainfall. Thunderstorms usually provide sufficient rain during the growing period, but the use of irrigation may be necessary in mid-summer to offset any lack of moisture when the weather is becoming hot. The crop is then well on the way to maturity.

The Bureau of Rural Development is, therefore, desirous of greatly increasing the cotton yield and, with this end in view, is prepared to make available irrigation plants to those landholders who have suitable cotton lands and enough water for irrigation.

The irrigation plant is bought and installed by the Department of Irrigation and Water Supply. Every attention is given to ensure efficiency. Any prospective cotton irrigationist is required to have his own motive power, either a tractor or a stationary engine.

The irrigation plants are bought at cost price and an applicant is only required to repay to the Bureau the actual cost of plant, together with railage, cartage, and erection costs. The total cost price of the plant is regarded as a loan repayable to the Bureau, by annual instalments on the 30th June each year over a period of ten (10) years, without interest. No interest is charged, but the farmer has to undertake to grow and irrigate annually an acreage of cotton, generally round about 10 acres.

No security over a farmer's land or any other assets is required, except, of course, an agreement to repay the loan, with the usual requirements of such an agreement. Any interested landholder is asked to get in touch with the Bureau of Rural Development, Brisbane, when full particulars will be sent to him, also an application form.

Early applications are desired so that a good number of irrigation plants can be put in before the cotton planting season commences.

Drought Compensation for Wheatgrowers.

REFERRING to the £20,000 grant which has been made by the Commonwealth Government under *The States Grants (Drought Relief) Act*, 1940, for the purpose of alleviating any hardship suffered by Queensland wheatgrowers in consequence of the effects of drought upon their wheatgrowing activities during 1940, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, has announced that application forms are available on application to the State Wheat Board, Toowoomba. Application for assistance may be made by any wheatgrower who considers that he suffered hardship in the year 1940 because of drought on his grain crop, and who considers that, as a consequence, he is entitled to receive assistance.

Applications for assistance will not be considered unless the applicant signs an authority, embodied in the application form, authorising the Minister to depute an officer of the Department of Agriculture and Stock to examine the applicant's agricultural returns for the year 1940, rendered under *The Statistical Returns Acts*, for the purpose of verifying statements contained in the application. Applications for assistance must be forwarded to reach the Manager, State Wheat Board, Margaret street, Toowoomba, by not later than 9th June, 1941.

The Future of Agriculture.

FROM the very beginning of things, agriculture has been man's one big permanent job. With balanced agricultural resources, a nation can exist on its own. Without balanced agricultural resources, no nation can be strong. From that standpoint, Australians are particularly fortunate. Our civilization is an agricultural civilization. Our prosperity, our security are based on the products of the soil. Our welfare to-day and our whole future depends on our intelligent use of the land, on our intelligent observance of the principles of the science and practice of agriculture, and on our intelligent development of a real rural economy—an economy not only covering production, marketing, and distribution, but also social conditions.

One big thing that may come out of the present war, is the decentralisation of our population. It is easily conceivable that the use of new and more terrible methods of warfare will bring about the end of the One Big City, which can so easily be the most vulnerable place in any country as current events have proved. Modern transport on land and in the air already looks like sounding the death knell of the one big city idea. The necessity of decentralising war industries is already becoming a factor in the more rational distribution of our population. With all these readjustments of industrial and social economy, the land industries are bound to benefit. And during the period of readjustment agricultural co-operation must be developed to the advantage of all and the disadvantage of none. Changes occur no less in agriculture than in industry, and we must be prepared to change with the times and the needs.

Haymaking.

L. M. HODGE, Manager, Biloela Research Station.

THE objective to be achieved in converting a green crop into hay is to obtain the greatest possible weight of cured material of high nutritive value and attractive aroma, without undue loss of colour or palatability. To attain that objective the crop must be of a suitable variety or varieties, free from deleterious weeds, well grown, cut at the right stage, and properly cured.

The stage at which a crop should be cut for hay is shortly after the commencement of flowering, for if in the early flowering stage the crop yields the maximum amount of dry matter of high nutritive value. If the crop is cut too early the maximum yield will not be obtained, although the nutritive value is particularly high. On the other hand, if cutting is delayed until the ripening of the seed has advanced, the nutritive value of the resultant hay will be appreciably lowered as a result of increase in woody materials at the expense of proteins, and a decline in digestibility. It may be noted here that oats provide an exception to the general rule in that they are best cut when a proportion of the seed at the top of the seedhead has ripened and the bulk of the seed is still in the late dough stage.

The method of curing depends upon whether the material is coarse or fine, whether it is cut with the reaper and binder or with the mower, and upon the time of the year at which the crop is harvested. Binding the crop and stooking the sheaves protects the material from damage by rain, preserves the colour by avoiding excessive exposure to sunlight, and reduces losses due to rough handling. The winter-grown cereals are readily cured in this fashion, but the summer crops, when so treated, require careful watching because of the danger of mould development in the centre of tightly-bound sheaves in warm, humid weather.

In curing loose hay, rough handling and too frequent manipulation should be avoided, as they tend to cause serious loss through the breaking up and powdering of the more nutritious portions of the plant, such as the small leaves and fine terminal parts generally. Losses of this kind are also caused by allowing the hay to become dry and brittle before being put into cocks. These losses are particularly heavy when leguminous crops, such as lucerne, are being handled.

Naturally, the weather at haymaking time is of vital importance to the quality of the product. While it is impossible to avoid risks, the average farmer acquires a degree of weather sense from experience of his own locality, and he should endeavour to arrange his haymaking to coincide with fine weather. Wet weather will rapidly spoil a crop cut for hay, as the material contains nutrients that are easily dissolved by water and so readily washed out during rain. Excessive drying and exposure to the sun should also be avoided, as they cause loss of green colour and shattering and loss of the valuable leafier parts of the plants.

The best cured hay results from a fairly rapid drying. Evaporation of moisture is facilitated by high air temperatures, sunshine, and wind, whereas high atmospheric humidity retards loss of moisture from the cut crop. If the weather is mild and windy, curing of loose hay in the

windrows may be sufficiently thorough to reduce the moisture content to the desired level, and at the same time yield a fragrant, green hay in the stack. On the other hand, if the weather is hot and the atmosphere dry, or if rain threatens, the swaths should be raked and put into cocks as soon as possible.

The hay should be stacked or baled before it becomes brittle, otherwise serious losses will occur due to shattering and powdering and, in addition, the chaff made from dry hay contains an undue amount of irritating dust. If stacked or baled when too damp, however, the hay will heat, develop moulds, and spoil. In cereal or other grassy hays, the upper nodes or joints of the straw should be dry before the hay is put into stacks or bales. Where the hay is stooked, a sample for examination prior to stacking or baling should be drawn from the inside of a central sheaf, and, where the hay is loose, from the inside bottom of a cock.

Coarse salt may be sprinkled over the layers as they are built into the stack. This increases the palatability of the hay.

Haystacks should be well-built according to the directions given later in this article; they should be situated above flood-level, and securely protected against rain, fires, and vermin. While hay will keep for several years if properly stacked, it deteriorates with age, and it is a good plan to feed or otherwise dispose of stacks when they are three years old, replacing them with new hay.

Hay may be baled as an alternative to stacking, and in this form it is easily handled, transported, and stored. Baled hay is the only form of hay for which a large demand exists in the produce market. Care must be taken that hay baled direct from the field is sufficiently cured, otherwise heating may occur under high pressure and the product be ruined.

CROPS SUITABLE FOR HAYMAKING.

The crops which are utilised for hay purposes in Queensland may be divided for convenience into summer-grown and winter-grown crops. The former comprises Sudan grass, saccharine sorghums, Japanese millet, white panicum, giant setaria, lucerne, and cowpea, while the main winter-grown crops are wheat, oats, barley, canary seed grass, field pea, and vetches or tares. In addition, native and cultivated pastures are at times harvested for hay purposes, and occasionally the peanut is used for the same purpose. The most valuable hay crop is lucerne, which persists for a number of years, produces several cuttings each season, and yields a hay of high nutritive value. Of the annual hay crops, Sudan grass and wheat are the most important. Japanese millet, white panicum, and giant setaria do not yield as heavily as Sudan grass, but are better dual-purpose crops in that they may be grazed at any stage of growth without danger to stock.

The sowing of either summer-grown or winter-grown hay crops should always be preceded by a period of bare fallow, during which weeds are eliminated, moisture is conserved, and soil fertility is improved by decomposition of organic matter. A gradual working down of the land to a fine tilth should be aimed at, but care must be taken not to expose the land unduly to the erosive action of water. Finally, the preparation of a fine, firm seed-bed to assure a rapid, even germination of the seed is essential.

In the drier inland agricultural areas, where soil moisture is the principal limiting factor to crop growth, ploughing should be completed several months in advance of sowing. In districts where the rainfall is more regular and abundant, later ploughing and consequently a shorter fallow period may be adopted. The fallow period, however, should always be sufficiently long to assure that a proper tilth is achieved by sowing time.

Summer-grown Crops.

The time of sowing of annual summer hay crops should, if possible, be so arranged that these crops, which are usually ready for cutting in six to nine weeks, do not reach that stage during the height of the summer rains. Lucerne should be sown in April or May.

Sudan Grass.

Sudan grass is normally a hardy annual, although it may persist for two or even three seasons under frost-free conditions; nevertheless it is generally unprofitable to persist with a crop of Sudan grass beyond a single season. Thick-stemmed plants of Sudan grass are difficult to cure, and it is advisable, therefore, to make a heavy sowing of seed in order to induce the production of a fine-stemmed crop. The seed is preferably drilled, using every grain run, at the rate of between 10 lb. and 12 lb. to the acre, but it may be broadcast at the rate of 20 lb. to the acre and covered by harrowing.

Plate 72.

HARVESTING A CROP OF SUDAN GRASS IN CENTRAL QUEENSLAND.

The crop (Plate 72) may be cut with the reaper and binder, in which case the sheaves should immediately be put into small stooks permitting free circulation of air around the sheaves. A very succulent crop tied by the binder may spoil in the sheaves, no matter how carefully it is cured, and such a crop is best harvested with a mower or with a reaper, the bundles in the latter case being tied by hand after wilting has occurred. If cut with the mower, the crop should be wilted in the swath and in the windrow and further cured in cocks, which should be of small size if the weather is cool or cloudy.

Sudan grass at all stages prior to flowering is regarded as potentially dangerous to stock, but the cured hay, made from a crop that has just flowered, is generally considered to be safe as a stock food. The regrowth should not be cut for haymaking purposes until the crop has once more flowered.

Saccharine Sorghums.

The saccharine sorghums are grown almost entirely for green feed or for silage, since they are difficult to handle and to cure as a hay crop. If sown for hay, broadcasting of the seed is preferable to sowing in drills, since a more slender type of plant will be developed. The sowing rate should be between 15 and 20 lb. to the acre. They are best cured in bundles in the field and subsequently stacked on end in a slanting position. They make a very coarse hay, which should be chaffed before being fed to stock; even when chaffed, however, the hay is very hard on the mouths of the stock to which it is fed and has little to recommend it.

Millets.

The millets, including white panicum, and giant setaria are quick-growing, hardy annuals which are able to make satisfactory development under fairly dry conditions. The seed should be drilled or broadcast at the rate of 10 lb. to 15 lb. to the acre. On account of their succulent nature the millets take longer to cure than giant setaria, but they make excellent hay when they are cured. White panicum makes a particularly fine hay. All of the group have a free-seeding habit and, if allowed to mature their seed before being cut, may cause a good deal of trouble in succeeding crops. If they are cut in the flowering stage, however, no trouble is experienced. A crop cut before maturity will usually make a second growth useful for grazing.

Lucerne.

The culture of lucerne for hay purposes is described in another article which will appear at an early date, and only a general outline of the haymaking process is given here. Probably no other hay crop requires such skill and attention to detail during the curing processes as does lucerne. Lucerne hay, to command the highest price on the market or to be of greatest value to the grower as a form of conserved fodder, should be bright green in colour, fragrant, and contain a large proportion of leaf. It should be free from weeds and rubbish and contain a minimum of dust or other irritating matter. The principal mistakes causing losses in yield or in quality are cutting too early or too late, not curing sufficiently, and over-curing.

The crop should be cut in the early flowering stage. If cut earlier, the maximum tonnage is not obtained, and if cut too late much of the lower leaf is lost, the stems become woody, and the quality of the hay suffers accordingly. In addition, late cutting delays the growth of the succeeding crop and may result in the loss of one cutting during the season. Lucerne should be cut with a mower, as it is too succulent to admit of being bound and stooked. If the crop is wet from dew or rain, cutting should be delayed until the surface moisture has evaporated.

In fine weather the swath may be raked into windrows two or three hours after cutting. The operation should not be delayed until the plants have become dry and brittle, as they may then lose sufficient

leaves to lower seriously the quality of the hay. The windrowed material, further, should be put into cocks before the leaf is dry enough to shatter. In order to obtain the maximum shading with the freest circulation of air and to protect the cocked material from rain damage, the cocks should be built tall and narrow. It is advisable to inspect the cocks each day while curing proceeds and to open them if mould development threatens. Sometimes the top half of the cock is lifted off, placed on the ground, and the bottom portion inverted on it. In fine, hot weather two days in the cock should be sufficient, but this period may be extended to four days if the weather retards moisture evaporation.

The cocks should not be stacked until the moisture content of the lucerne is reduced sufficiently to prevent spoilage in the stack. The lucerne hay should be stored in a shed, but if it is necessary to stack it in the open the stack should be protected from rain; otherwise some wastage will occur.

Cowpea.

The hay made from cowpea is rather difficult to cure satisfactorily because of the different rate of drying of leaf and stem. If allowed full exposure to sun and wind, the leaves dry progressively from brittle green to brown and finally drop off while the coarser stems are still moderately succulent. In order to counteract this it is necessary to select a fine-stemmed variety and to sow broadcast, at the rate of 30 to 50 lb. per acre, with the object of inducing the development of fine stems. The sowing rate will, of course, depend on the size of the seed of the selected variety. Victor and Poona are the most suitable varieties for haymaking purposes, both being relatively fine-textured and capable of producing heavily.

The art of curing the crop lies in inducing the leaves to retain their normal function sufficiently long after cutting to drain the moisture from the stems. The crop should be cut with the mower when the pods have become fully developed but before they commence to ripen. It should be turned frequently, if the hay is being made on the coast, before being put into cocks which should be tall and narrow to permit as free circulation of air as is possible. In drier inland districts, such as the Callide Valley and on the Darling Downs, however, during hot sunny weather the crop may be put direct into very small cocks from the swath after a few hours of wilting. As drying proceeds, the cocks should be made larger by inverting one on top of another, repeating the process until each cock consists of three or four of the originals. They should be as tall and as narrow as possible. Before stacking the cocks, the stems should be carefully examined for excessive moisture. Under good growing conditions a yield of 2 tons to 4 tons of hay per acre may be expected.

Winter-grown Crops.

The cereals—wheat, oats, barley, and canary seed grass—may be planted over a wide period, but mainly from March to June, although canary seed grass sowings may be made satisfactorily as late as August. The best harvesting months for cereal hay crops, however, are August and September, and it is advantageous to arrange the main sowings to mature for hay during those months. Varieties differ a good deal as regards the time required to reach the early-flowering stage. Early, i.e., quick maturing, varieties may be ready to cut in three

months, while late, i.e., slow maturing, varieties may require about four and a-half months; so that an early wheat should be sown in June for harvesting in September, while a late variety would need to be sown in April or May. May is the best month for general sowings to be made.

The winter-grown leguminous hay crops should be sown in early autumn, as it is desirable that they be harvested before they suffer a setback due to dry conditions during the spring months.

Wheat.

Wheaten hay is usually converted into chaff before being marketed or fed on the farm, and the aim in haymaking is to produce a hay which will yield a good quality chaff. The principal factors controlling the character of the hay are season, soil, husbandry, curing practices, and variety.

To be of good quality, wheaten hay must be made from a well-grown crop, and it is advisable, therefore, to cut the main hay supplies in good seasons rather than in poor seasons. Loamy soils of high fertility produce a hay of good body and of high nutritive value, whereas poor, light soils often develop a crop curing into a light, inferior hay. Cultural practices should aim at the provision of favourable soil conditions and the elimination of weeds.

The ideal variety of hay wheat should possess certain characters which are not of primary importance in a grain crop. It should be capable of heavy production of green material, possess a stout-walled straw which will cut into a clean, heavy chaff, have straw and flag of a bright green colour, and be devoid of awns and dark-brown coloration of the ears. Further, the variety should possess a high degree of resistance to stem and leaf diseases. The main hay varieties in use in Queensland are Clarendon, Warren, Florence, and Warchief.

The general rule in regard to rate of sowing is that a lighter rate should be employed where soil moisture is likely to be deficient at some stage of the growth of the crop than where ample soil moisture is available. The sowing rate for a hay crop is heavier than that for a crop sown for grain, since a longer straw is desired. The available moisture usually will support the denser plant population, because the hay crop occupies the land for a considerably shorter period than does a grain crop. The average sowing rates recommended for sowing from April to mid-May are 45 to 55 lb. per acre, and for later sowings, 55 lb. to 65 lb. per acre.

The period required for germination of the seed in a warm moist soil is five or six days, and the depth of planting should be sufficient to ensure that the seed is in contact with moist soil for that period. In most soils from 2 inches to 2½ inches is a suitable depth, but the seed should be planted deeper if the soil is likely to dry out to a depth of 2 inches in a short time.

The grazing of wheaten hay crops in Queensland is not recommended, except where a rank, sappy growth is developed by the young crop. Grazing may safely be carried out only when the crop is in the grassy stage and before the seedheads commence to form inside the leafy

Plate 73.
WHEATEN HAY IN THE STOOK.

shoots. If the shoots containing the developing seedheads are grazed off, subsequent growth of the plant is mainly from less advanced shoots, and a good hay crop is not formed. The presence or absence of the miniature seedhead may be ascertained by splitting open some of the most advanced leafy shoots.

The correct time to cut wheat for hay in order to secure the maximum yield, consistent with high nutritive value, is not later than eight days after the wheat crop has flowered. Cutting with the reaper and binder not only effects a saving of labour but also favours the production of a hay of good quality. At least two rounds should be cut before the outside of the crop, which has been trodden by the horses, is harvested. If portions of the crop are to be left for grain, firebreaks may be formed by a judicious choice of the areas harvested for hay purposes.

The sheaves usually should be large and firmly bound, as this ensures that a large proportion of the hay is protected from the bleaching action of the sun. If the crop is sappy, small sheaves are advisable in order to guard against mould development. The sheaves should be stooked as soon as possible after cutting, and it is a good practice to have the stooking gang keep pace with the binder. For this purpose, one man per ton of hay per acre is necessary if the reaper and binder is in operation all the time. The average number of sheaves which should be placed in a stook is twenty, but a lesser number is desirable if drying conditions are not good. The long, narrow type of stook is considered preferable to the round stook in the wetter districts.

Sheaved hay cured in stooks is usually ready for stacking in about fourteen days, but this time is only approximate, and the hay should be stacked as soon as the upper joints of straws drawn from the middle of the sheaves are dry. Over-exposure of the sheaves in the stooks tends to make the hay hard and brittle, with a lowering of the quality of the chaff.

When hay is being chaffed for marketing purposes, all mouldy or inferior sheaves should be discarded, and the chaff placed in clean, sound bags neatly branded. If chaffed in very hot, dry weather, wheaten hay tends to shatter and powder. It is advisable, therefore, to cut the chaff in humid weather or when practicable to apply high-pressure dry steam to the hay as it is being chaffed. The blades of the cutter should be kept sharp and should run close against the face plate, otherwise the chaff will be broken, uneven, and unattractive.

Oats.

Although oats are widely grown for grazing and green fodder purposes in Queensland, the amount of oaten hay produced is small and very little local hay is marketed. The crop tends to be somewhat coarse and rank in Queensland and is liable to lodge during wet weather, but its main disability is the susceptibility of the varieties in use to rust.

Oats may be sown from February to June, but it is usually desirable to sow during the March rains in order to secure a cutting for hay purposes in late August or during September, when the weather is favourable for haymaking. In the southern districts, a long-season variety, such as Algerian, if sown early, will usually give a winter

grazing and a hay cut in the spring. Early maturing varieties, such as Sunrise, Mulga, Belar, Buddah, Fulghum, and Palestine, are preferable in the central district, where the spring is usually extremely dry.

The rate of sowing varies between 40 and 80 lb. per acre when drilled, with somewhat heavier sowings when broadcast. Lighter sowings give a greater margin of safety under dry conditions. Coarse-stemmed varieties should be sown at a heavier rate than fine-stemmed varieties in order to reduce the thickness of the stems.

As with wheat, grazing should not be permitted except on rank-growing crops, and then only during the tillering stage. Less vigorous crops should not be grazed, and the reader is reminded that stock may destroy an undue proportion of plants on loose, open soils by pulling them out of the ground.

The proper stage at which oats should be cut for hay is when the bulk of the seed is in the late dough stage. This is indicated by the top seeds on the seedhead turning white. The chief reason for delaying the cutting of oats for hay until after flowering has ceased is that chaff buyers prefer oaten chaff containing grain. The purplish-green colour of chaff prepared from oaten hay cut in the late dough stage is taken by buyers as an indication that harvesting was carried out before the seed ripened and shattered.

The curing of oaten hay and its conversion into chaff follow the practices adopted in the case of wheaten hay and chaff.

Field Pea.

The field pea gives best results as a hay crop when grown on fertile, well-drained soils in districts where ample winter rainfall and mild spring conditions usually prevail.

If sown alone, about 60 lb. of seed to the acre is generally used, care being taken to plant fairly deeply, between 2½ inches and 3 inches being the best depth at which to sow.

Although the field pea is a hollow-stemmed plant, the hay is rather difficult to cure. In general, the directions given for the curing of lucerne hay should be followed. The field pea is more easily harvested and cured when sown in admixture with oats or wheat than when sown alone. Because the pea seed germinates better at a slightly greater depth than is usual for the cereals, the former should be sown first. An average planting rate is 20 lb. of field pea to 40 lb. of wheat or oats. Lighter sowings than these are preferable where growing conditions are likely to be unfavourable.

Vetches or Tares.

The climatic range of vetches or tares is similar to that of field pea. They make an excellent hay and are more easily cured than is field pea; nevertheless they are but little used in Queensland. As a hay crop they are best sown with a strong-stemmed wheat which serves to keep the vetches or tares off the ground and also facilitates harvesting. The legume and cereal seed are best sown separately, at the rate of 20 lb. of vetches or tares to 40 lb. of wheat per acre. When vetches or tares are grown with wheat, the usual practice is to cut the mixture when the wheat has reached the correct hay stage, although at this time the legume generally has not commenced to flower.

Plate 74.
WHEAT AND VETCHES OR TARES

Pasture Hay.

Conservation in the form of hay of excess growth produced by pastures during the summer growing season is practised to some extent, and occasionally after a good winter, hay is made from certain winter-growing pasture plants, such as prairie grass and ryegrasses. The most productive of the pasture grasses utilised for hay purposes is Rhodes

Plate 75.
A WELL FILLED HAY SHED.

grass, a native of Africa, widely used in Queensland for pasture purposes. Many of the native grasses make a satisfactory class of hay if cut at the proper time, correctly cured, and securely stacked. The chief of these are the various blue grasses, star grasses, Mitchell grasses, and Flinders grasses, most of which often occur in almost pure stands. It is advisable to utilise for hay only pastures growing on good soils, as these may be expected to comprise the more valuable grasses, to yield well enough to repay the cost of haymaking, and to be of satisfactory nutritive value.

The correct time for cutting pastures for hay is during the flowering period, and as this stage may not occur more than once during a year and is then very brief, only a very short space of time is available for harvesting. Native grasses outside the wet tropics usually possess much fine leaf matter, from which nutrients may easily be lost by improper curing. The swaths should be raked into windrows immediately after cutting. If the weather is sunny and windy, the hay may be stacked direct from the windrow, but in very hot, dry weather the period of curing in the windrow should be materially reduced and the hay put into cocks in order to prevent excessive drying and powdering. It is essential to stack the hay as soon as it is ready, otherwise deterioration through over-exposure will occur. A liberal sprinkling of coarse salt on each successive layer when stacking will improve the palatability of the hay. Stacks should be protected from rain by a galvanised iron roof.

HAYSTACKS.

The frequency with which heavy rains are experienced in Queensland renders it necessary that haystacks be built on a site above flood level, well floored, soundly constructed, and securely roofed. A suitable base may be constructed from bush timber by laying stout saplings about 8 inches apart across bedding logs of 10-inch diameter spaced 6 feet apart on the site of the stack. Alternatively, a permanent floor may be made with loose stones built into a level platform about 1 foot high.

The shape and the size of the stack should be determined before building is commenced. Round stacks are convenient for small quantities of hay, but require more skill in topping off than do square or rectangular ones. As a rule, the best type of stack is that which exposes the least possible amount of hay to the weather, and the rectangular stack satisfies this requirement.

In determining the size of the stack to be built, the tonnage of hay to be stacked has first to be estimated. Working on this estimate, and using the following table, the amount of space to be provided may be calculated:—

TABLE 1.

CUBIC FEET PER TON OF HAY.

Period.	Oats.		Wheat.		Lucerne.
	Sheaf.	Loose.	Sheaf.	Loose.	
Freshly stacked	350	400	400	500	400–450
One month after stacking..	300	350	350	400	350–400
One year after stacking ..	300	325	325	350	300–350

The required size of stack for an estimated amount of hay may be ascertained by rèference to the following table, which shows the length of stacks of various sectional dimensions required to store 1 ton of average hay:—

TABLE 2.

Average Width.	Height to Eaves.	Height of Pitch.	Length for One Ton.
Feet.	Feet.	Feet.	Feet.
10	8	4	4·0
10	10	5	3·2
12	10	8	2·4
12	12	8	2·1
13	10	8	2·2
13	10	10	2·0
14	10	10	1·9
14	12	10	1·7
14	14	10	1·5
15	12	10	1·6
15	14	10	1·4
16	12	10	1·5
16	14	10	1·3
18	12	10	1·3
18	14	10	1·2
20	14	10	1·0

Where large amounts of hay are being conserved it is advisable, in order to lessen the risk of total loss by fire, to build separate stacks suitably spaced and each containing no more than 50 tons of hay.

Building Haystacks.

It is important in constructing haystacks, whether of loose or of sheaved material, that the centre be higher than the edges upon the completion of each layer. The straws throughout the stack should tend downwards and outwards, in order to prevent beating rain making its way into the stack from the sides and to divert to the outside any water which may penetrate the roof.

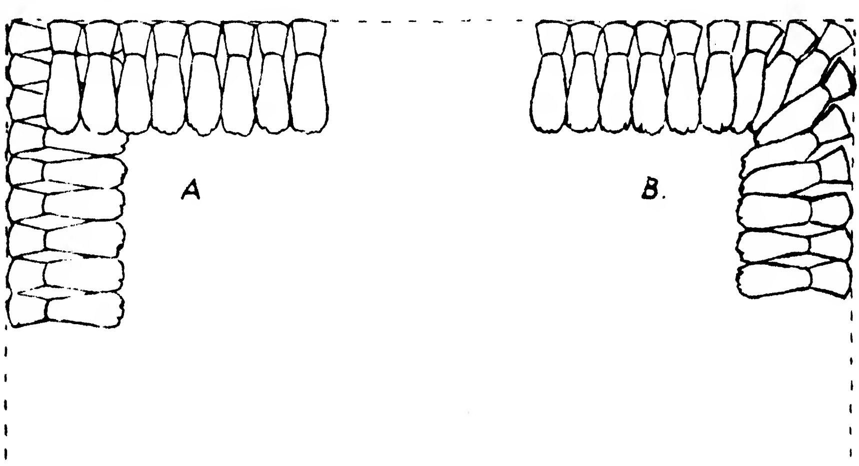


Plate 76.

COMMENCING A STACK OF SHEAVED HAY.

When stacking sheaved hay, a bed of loose material, such as straw or loose hay, should be laid on the floor so as to give a rise of about 18 inches from the edges to the centre. Stacking of the sheaves is usually commenced at the edge of the stack. The outside layer consists of sheaves laid side by side as closely as possible with butts outward and their line accurately defining the ground area of the stack. The corners may be turned in either of two ways, both of which are illustrated in Plate 76. The method shown at B makes the stronger corner, unless the sheaves are very short. The longest sheaves should always be used for the outside lines, and particularly for the corners, as they lock more securely than short sheaves.

The second row is placed shinglewise upon the first, butts outward, leaving about 1 foot of the first line exposed. This is a binding row and follows the outside row right round the stack. Successive lines of sheaves, each one nearer the centre, follow until the centre is reached, where a line of sheaves laid lengthwise makes the centre line solid.

The stack is built in this way to the eaves, which are formed by projecting the two topmost outside lines of sheaves 4 inches to 6 inches beyond the edge of the stack. The pitch of the roof is then made by laying each successive outside line of sheaves inside instead of directly above the last, the floor of the stack thus becoming smaller with each successive layer of material, until the final layer is only as wide as a sheaf is long (Plate 77, fig. AA), and the sheaves, placed head to butt, overlap each other completely.

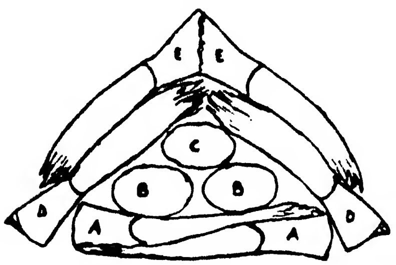


Plate 77.
RIDGING AND CAPPING A STACK OF SHEAVED HAY.

The first layer of the ridging sheaves (Plate 77, fig. BB) consists of solid, well-bound sheaves laid lengthwise and fastened together in pairs with a hayband to prevent them from spreading. Upon these are laid a single line, butts overlapping heads, to form the ridge (Plate 77, fig. C).

The capping sheaves consist of a line (Plate 77, fig DD) laid butts down against the ridge so that their heads overlap on the ridge line C. These should, for security, be held in place with stakes pushed through them at several places and connected with a line of binder twine. The final capping sheaves (Plate 77, fig. EE) are placed astride the lines DD, butts upward. These are fastened together with a hayband in order to make them firm and secure at the peak. To make the hayband, a handful of hay is bent out on each side of the string tying the sheaf and twisted to form a hayrope attached to the string band of the sheaf. The end of this hayrope is then twisted into the string of the companionate sheaf and the two are firmly tied together and may be placed astride the ridge. When completed, the whole capping should be made secure with stakes and twine.

Thatching and Roofing.

However soundly it may be constructed, a haystack may be partially or wholly ruined unless it is secured against entry of rain water. A straw thatch may provide insufficient protection against heavy rains,

unless the work is done by a highly skilled thatcher, and it may therefore be advisable for all stacks built in the open to be provided with a galvanised iron roof, more particularly if the hay is not to be used for some considerable time. For a gable-roofed stack, such as has been described, the iron may be nailed to 3-inch by 2-inch hardwood battens and capped with ridge-capping. A 10-feet sheet of iron on each side will cover a stack 15 feet in width, provided the pitch of the roof does not exceed 7 feet.

A turtle-backed roof has given good results in Queensland. It consists of curved 24-gauge corrugated galvanised iron, the curve being formed by bolting two 10-feet sheets, each machine-curved to a 12-inch spring, end to end. This union forms an arch having a span of approximately 15 feet, with a height of 42 inches. The advantages of this roof are ease of construction and handling and security from both wind and rain. The cost of a turtle-back roof to cover a 50-ton stack is about £20.

It is necessary to punch and assemble this type of roof on the ground. A convenient stand for this purpose may be made by fixing a stout rail parallel to a level piece of ground and at a height of 42 inches above it. The rail should be about 12 feet long, in order to carry three pairs of sheets of iron and to leave sufficient working room. The pairs are bolted together, as shown in Plate 78. When three pairs have been joined, the rear or first pair is unbolted and the sheets numbered 1 and 1A, care being taken that the lettered number is always on the same side. Another pair is then fitted to the working edge and the procedure repeated until the whole roof has been assembled, numbered, and taken apart ready for building on top of the stack.

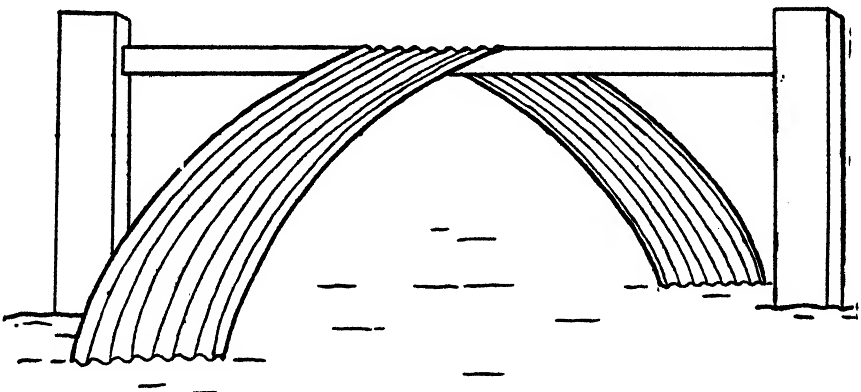


Plate 78.
BOLTING OF IRON SHEETS.

When punching the bolt holes it is advisable to avoid making them too neat for the ¼-inch bolts, as some play is necessary to permit the bolts to be passed through the several sheets of iron when working on the yielding stack. The sheets are joined at the top of the arch by three bolts, the outside bolts also holding the overlap of the neighbouring pairs, an overlap of 6 inches being given. Two bolts are inserted down each side of each 10-feet sheet, so that each complete arch is joined to its neighbour by five bolts.

The prepared sheets are hauled on to the stack in a suitable rope sling, and the builder bolts the first pair together, with the outside and centre bolts at the top of the arch. The next pair is joined by the centre bolt only, before the set is joined to its neighbour. Two men are required for this work.

Care must be taken to secure the turtle-back roof against sudden winds while it is being fixed. Cables of strong galvanised fencing wire should be passed over the roof at intervals of 4 feet and sufficient weight suspended from each end. The wires and weights should be left on the stack in order to hold the roof securely, but the weights must not be permitted to reach the ground as the stack settles.

Protection from Vermin.

Haystacks may be protected from mice by surrounding them with a fence constructed of 6 feet by 3 feet plain galvanised iron sheets running lengthwise with the edges let into the ground to a depth of 6 inches. The fence is generally built with a lean outwards of not less than 6 inches from the perpendicular. It is advisable to solder "eyebrows" at the tops of the corners. While galvanised iron fencing is expensive, it is extremely durable.

BALING HAY.

For marketing purposes hay must be put into bales, unless it is chaffed and bagged. In Queensland, the market demand normally is for chaff rather than hay, but for drought-feeding of sheep baled hay is widely used. Where hay is conserved on the farm or pastoral holding, stacking in the baled condition is preferable to storage as loose hay, since baled hay is more conveniently handled, transported, stored, and fed to stock in the paddock.

Baling of hay may be carried out in the field from windrows, cocks, or stooks, but in cases where it is desirable to remove the hay to shelter as rapidly as possible, baling is most conveniently done from the stack. In order to avoid losses due to heating under pressure in the bales, the hay should not be baled in the field until the moisture content has been reduced to a somewhat lower level than the maximum permissible in loose hay at the time of stacking. The regulations under "*The Stock Foods Acts,* 1919 *to* 1935," limit the amount of moisture allowed in hay offered for sale to 12 per cent. by weight, unless the actual amount is declared on the invoice and at the time of sale.

There are two main types of hay presses in use—namely, the box, derrick, or dump baler and the perpetual press. In making bales with the former type of press, the hay is fed into the press in several portions or charges, and each portion is compressed separately by a plunger or ram. Unless special care is exercised in filling, the hay tends to become somewhat tangled in the bale and cannot be easily separated into portions when being fed to stock. For this reason the hand-pressed bale, which results from continuous pressure in a perpetual press on a heap of hay in a frame, is favoured by purchasers intending to feed the commodity in the form of hay.

In preparing hay for the market, the farmer should bear in mind the regulations under "*The Stock Foods Acts,* 1919 *to* 1935," dealing with weight of battens on bales and with foreign ingredients. The total weight of battens on each bale must not exceed 10 per cent. of the gross weight of the bale. In order to achieve this and to provide for a

uniform pack, no more than eight battens should be used on each bale. The battens should not be longer than the bale itself and they should not exceed 3 inches in width nor half an inch in thickness. The presence in hay offered for sale of plants, parts of plants, and seeds of Bathurst burr[1], Noogoora burr[2], castor oil plant[3], thorn apple[4] (also known as datura or stramonium), dodder[5], corn cockle[6], khaki weed[7], poppy[8], and prickly poppy[9] is prohibited.

[1] *Xanthium spinosum.*
[2] *Xanthium pungens.*
[3] *Ricinus communis.*
[4] *Datura* spp.
[5] *Cuscuta* spp.
[6] *Agrostemma githago.*
[7] *Alternanthera repens.*
[8] *Papaver* spp.
[9] *Argemone mexicana.*

LUCERNE HAY.

Baled lucerne hay, or lucerne chaff, and maize grain are now recognised as one of the principal bases of supplementary or drought feeding, if the fodder has to be transported over long distances. Increased attention is, therefore, being given to the production of good quality lucerne hay. Good hay containing 45 per cent. to 50 per cent. of leaf will always command a good price, while a weathered or sweated consignment will be hard to sell.

Very careful handling is required from the time lucerne is cut until it is stacked or baled for market. Prime lucerne hay should be green in colour, dry, free from weeds or rubbish, and should contain a high proportion of leaf. Prevailing climatic conditions are, naturally, an important factor, and, whenever possible, cutting should commence in bright, fine weather. Lucerne should be cut shortly after the first flowers have appeared, when numerous young shoots will usually be observed at the base of the crowns. When the plants are allowed to become over-mature, actual loss of weight and feeding value occur, as leaf will be lost, and the stems will harden, thereby becoming largely indigestible. It is customary to commence mowing in the morning as early as possible, after any heavy dew has evaporated. During fine, hot weather raking may commence about mid-day. Raking into windrows should, if practicable, be completed by nightfall, as much leaf may be lost if the lucerne is left too long in the swath. After wilting for a few hours in the windrows, fork into high, narrow cocks which encourage the natural transpiration of moisture better than if broad, flat cocks are made. If rain occurs the lucerne will require turning to prevent the formation of mould, but during fine, hot weather it is possible to stack within two days of cutting. Excess moisture will induce mould, and possibly combustion in the stack, while if the lucerne is allowed to become too dry it will lose appreciatively in palatability, weight, and appearance. Before carting, the stems should be tested by twisting them between the hands, when any excess moisture will become evident.

Wherever possible, lucerne hay should be stored in sheds, but if it becomes necessary to stack it in the field, a framework of logs should be laid down, care being taken to keep the centre of the stack high during building. Large stacks which are likely to be held for some years may be protected by thatching or by a temporary galvanised iron roof.

Proximity and accessibility to the chief markets is obviously an important factor in the profitable production of lucerne hay for direct sale.

Pineapples in the Queensland Tropics.

W. G. HANCOCK, Plants Inspector, Townsville.

THE improvement in pineapple culture developed during recent years is generally well known; in fact, it is doubtful if there is any fruit industry which has made so much progress in so short a time. Average crops per acre have been increased, the crop can be timed to mature within close limits, and the effective life of a planting has been lengthened. That bane of the farmer—"wilt"—nowadays causes little trouble. However, while the large amount of experimental work which has been done, mostly in the South, is equally applicable in principle in North Queensland, certain modifications in detail are indicated owing to different climatic conditions and growing for market rather than for the cannery.

As elaborated later, the climatic extremes of North Queensland, its torrential rains, its periods of hot dry weather, together with the high soil temperature during periods, all constitute special problems.

The Pineapple Plant.

The pineapple is a Monocotyledon, and belongs to the natural order Bromeliaceae. Many related plants are grown in bush houses. It has also in close relationship a number of plants leading a semi-aerial life on trees and rocks, such as orchids. Another of the Bromeliaceæ, the "Spanish Moss" of Florida is entirely air dwelling. The pineapple bears no relationship to the cactus family, as popularly supposed.

In accord with this family relationship the pineapple's roots are intolerant of poorly-aerated soil conditions. It is a shallow-rooted plant thriving in a loose, moist medium.

It gives another indication of its ancestry in its habit of forming new roots from its ageing leaf axils. Under natural conditions these would be continually covered by accumulating layers of leaf debris. In cultivation it is often of benefit to shovel soil in amongst the butts of plants as they become older.

The leaves are specialised to make the most effective use of a sparse rainfall, and at the same time, by shading the soil, to keep it cool and moist and hinder evaporation. Even a heavy dew will provide an appreciable quantity of water to the roots.

Soil and Site.

The above brief examination of some points in the plant's status suggest that it will do best in a loose, open soil, well drained but moisture-retaining, and with a high humus content. In practice this description exactly fits those soils growing the best plants. A good crumbly sandy loam overlaying a moisture-retaining but well-drained subsoil is probably the ideal.

The plant is strongly influenced by the amount of available iron in the soil. The availability may depend on the degree of acidity of the soil. Broadly, in an acid soil the iron is available, while in the contrary case it is not.

However, it is often noticed that plants make very satisfactory growth in a newly-cleared soil. In this case the soil will be found to be rich in humus left by the recently cleared vegetation. While the humus lasts it will itself supply the plant with iron, but, after several years of exposure, the supply will be exhausted. This shows readily enough the necessity of humus.

Very heavy compact soils are not suitable, for reasons already advanced, and very sandy soils are usually deficient in nutrients and highly leached of iron and other elements; furthermore, they dry out too quickly.

In brief, the points to look for in choosing a pineapple soil are—perfect drainage, moisture, loose open texture, and a high humus content. In addition, a suitably acid reaction or one capable of being rendered so.

In choosing a site one naturally ignores any situation subject to flood, and, conversely, any site, such as a narrow ridge, which will become unduly dry during protracted dry weather. Land, either flat or with a gentle slope, is best in the tropics, where torrential rain will cause severe erosion on cultivated land with a pronounced slope. The aspect does not have such a pronounced effect as in the south.

Preparation.

Although the pineapple is a shallow-rooted plant, land should be carefully prepared. According to the nature of the soil, it should be broken up to a fair depth and worked to a good tilth. Some soils of a very sandy nature are often badly leached on the surface, while just below the usual plow depth there is a strata of similar texture but darker in colour and rather heavier. In such cases it is often advisable to turn up this heavier layer and incorporate it with the sandy top, thus enriching the latter with materials previously leached from it.

When sulphur is to be used (see later), it is evenly broadcasted over the prepared surface and lightly harrowed under. Old land will in all probability be deficient in humus, and every effort to rectify this will repay. In the drier districts this is not always a simple matter without irrigation. The summer is, of course, the normal period of growth of a green crop and is also the usual period for planting pineapples. If, however, a summer cover crop could be established early, and, as soon as this is ploughed under, a winter crop set, it should be possible to obtain a fair cover for the winter months and the land prepared for planting the following summer.

When it is intended to replant an old block of pineapples the old plants will provide a valuable source of humus if they can be cut up with a heavy rotary cultivator and allowed to rot. The late spring is a suitable time. The rotting process will be hastened and additional humus provided if a crop of cowpeas is sown amongst the rubbish and the whole lot plowed under together. A dressing of superphosphate will augment the growth of the cowpeas, and, through that, become available to the pineapples.

Planting.

A factor of major importance in tropical agriculture is high soil temperature. This is a problem peculiar to the North Queensland latitude. Of course some plants will tolerate far higher temperatures

than others, but few will thrive when the bare stem and the roots are subjected to soil temperature of between 130 degrees F. to 140 degrees F. on the surface. Optimum growth is probably made when with adequate moisture the surface is about 90 degrees F. A typical reading taken at 2 p.m. on a December afternoon when with a shade temperature of 84 degrees F. the bulb showed 90 degrees F. just buried in the shaded surface under thickly-growing pineapples, while it was 132 degrees F. just buried in the unshaded soil.

This shows what widely different conditions are enforced on plants growing as individuals under cultivated conditions as distinct from those growing in their natural state. For instance, in a tropical rain forest scores of plants are revelling in warm, moist conditions produced by the mutual shading. When the forest is cleared, however, not many of them, other than a few of the dominant large trees, would flourish when planted in rows on the same ground. Even those which clamber out into the sunshine require their roots to be in a moist shaded soil. In a flower garden, also, if plants are set closely enough for the foliage to touch they will stand up to heat which would quickly wither them had they been set wider apart.

The principle is the same with pineapples. For practical considerations room must be left to work amongst them, but from the point of view of vegetative growth the closer, within reason, they are planted the better. It should also be remembered that in the tropics bare cultivated ground deteriorates very rapidly through the loss of the humus.

The standard planting in South Queensland is to plant Smoothleafs in double rows set 2 feet apart and Roughleafs in single rows. In each case the plants are 12 inches apart in the rows. The inter-row space in each case is 4 feet. The number of plants per acre in each case will be 14,520 and 10,890 respectively. In the tropics it would seem better to put the plants 12 to 14 inches apart in the rows and have the inter-rows space 5 feet. The number of plants per acre, therefore, would be approximately 10.500 and 7,280 respectively.

Comment is sometimes heard that with this spacing it will not be possible, after the third crop, to get between the rows. This is answered by the fact that after three crops the fruit usually deteriorates in size and it becomes time to eradicate, renovate the soil, and replant, however it was planted, and it is poor business to deliberately set out to get two small crops when the fruit should be at its best, solely to be able to pick the third in comfort.

When laying out the rows consideration must be given to erosion and ease of working. In the tropics steep slopes are not advised. On a slight fall it is usually best to plant in short rows up and down the slope so as to shed the water quickly into cross drains. A lot however will depend on the soil type. Short rows and sufficient tracks will assist in handling the crop. While in South Queensland a north-south alignment is best so as to allow even illumination to each side of the row, in the tropics east-west is preferable since a better shade effect is obtained in early forenoon and late afternoon.

The actual planting is fairly simple, but care should be taken to lay out and plant evenly. The obvious way is to first lay out any tracks and then peg out the land at 7 feet or 5 feet intervals. A planting wire is stretched between pegs and the plants set out at the correct

intervals. A piece of iron rod beaten out flat at one end to a spear shape is a suitable planting tool. The work is much speeded up if the suckers are roughly laid out first. Deep planting should be avoided.

Planting Material.

Tops from cannery fruit are often used in the South. In North Queensland, however, even if available, they would probably be unsuitable by reason of the higher soil temperatures, unless weather conditions at planting time were very favourable.

Slips, which are the growths from the fruit stalk, can be used if well developed, otherwise they may not stand up to the heat.

Suckers are the favoured planting material. They are best when of medium size. Very large suckers which are near to flowering are unsatisfactory, since they will flower and fruit before being properly established. The fruit will be too small to be of any value, and, furthermore, they seldom make strong plants; their suckers sprout from high up and usually wilt when bearing a fruit. It is obvious that a fair percentage of these will seriously reduce the yield from a plot. If through shortage of material they must be used they should be planted separately and set deep. But they are seldom satisfactory.

The best size of suckers are those which will flower about six to seven months after planting. A quicker rooting will ensue if a few of the base leaves are stripped off. If it is necessary to keep suckers for any length of time before planting, they should be spread out in shallow layers in the shade. If heaped up they will sweat and rot. Always sort into two lots, large and small, and plant separately. To have sections of the farm cropping evenly will facilitate later operations, and, furthermore, large plants tend to shade and smother small plants, to their detriment.

Sucker Selection.

If any new plantation is closely examined at the time of the first crop, a wide range of variation between the plants will usually be noticed. The most obvious difference may be that some plants have already matured fruit, while others have not flowered. If this cannot be attributed to having planted suckers of unequal development, then there is a high probability of early and late maturing strains being present.

Another variation is that some plants are sturdy and squat, and are already growing several low-set suckers in addition to the fruit. Others have no suckers, but instead have a dozen or more slips around the fruit—a "collar of slips," as it is called. Between these two types—a good type and a most undesirable type—there may be many grades. Obviously the former plant is a profitable plant to grow, because it is a quick bearer and free-suckering, whereas the second type gives one good pine, but too often that is the first and last it will bear, since it has no suckers to bear subsequent crops.

Certain types of misshapen fruit are also hereditary, particularly "cripples" in Roughs. The sign of this is a thin, corky hairline throughout the length of the leaf.

Many variations will be found; some like the above are hereditary; others may be the result of variations in nutrition, but in general it is wise to propagate only desirable types and to reject all others. It is to

labour the obvious to point out that the returns of a plantation are reduced by a proportion of unprofitable plants. The danger is that when the "collar of slips" type, for example, is present, and selection is not practised, a vicious circle sets in, since there is considerably more planting material available from this type than from the suckering type, and eventually the bad type predominates and ousts the good type.

At first growers must be content to make the main planting from good average suckers, discarding all definitely bad types. Then, if at thinning out after the first crop a selection is made from the finest plants, and these are planted separately, a pedigree stock will soon be built up.

Time of Planting.

From the purely horticultural aspect, time of planting is largely governed by suitable weather, both at the time of planting and for the few months immediately following. To plant during times of torrential rain risks having young plants washed out, buried in silt, or rotting. To plant during the months of low rainfall would result in plants being very slow in taking root, and the effects of the consequent setback may be visible during the whole life of the plantation. The most important period in the life of a plantation is the first few months after planting. The plants must be brought on quickly so that in as brief a period as possible they become large enough to shade the soil under them. This is touched upon under "Fertilizing" from a different angle. The point stressed here is that it is best to plant when the longest period of good growing weather to immediately follow can be anticipated, and if necessary to later adjust the time of cropping by the use of acetylene.

The following table gives the months of the year when on an average the rainfall exceeds evaporation, and, therefore, gives some guide as to suitable planting months for the different divisions. In planning ahead, however, reliance cannot be placed absolutely on getting the average rainfall. At Townsville, for instance, the average on seventy years is 45 inches, but actual figures range from 9 to 97 inches.

Cairns	From Dec. to April-May
Innisfail, Coast ..	,, Nov. to Sept.
Innisfail, further inland	,, Dec. to June
Cardwell	,, Dec. to May
Ingham	,, Dec. to April-May
Townsville	,, Jan. to March
Ayr	,, Jan. to March
Bowen	,, Jan. to March
Mackay	,, Dec. to June

A general recommendation would be to plant in the drier districts between the end of December and end of February, and in the wetter districts just after the period of heaviest rain, which would usually mean planting about April.

Cultivation.

The golden rule is to cultivate as lightly as circumstances will permit. To keep down weed growth and break the soil surface is sufficient. Deeper cultivation than this only breaks roots and results in the deeper drying of the soil. To deal with the luxuriant growth of weeds during the period of the summer rains may justify or necessitate greater disturbance of the soil, but since there is more moisture

present not so much harm is done. The roots of plants maturing fruit, however, must not be broken. In particular, the time of transition between the period of the heavy summer rains and the dry months following is a critical one to plants maturing fruit, since their water requirements are high in order to continue to support the development of fruit, suckers, and growth produced during very favourable growing conditions. To damage their roots at this time gives them a severe set-back. Nothing but the hoe should be used within a foot of them.

The aim should be to so utilise the means available—sucker grading, time of planting, fertilizing, acetylene, and, if available, irrigation—that each section of the farm will be fruiting separately and in succession. This is quite attainable and makes operations much easier, since picking can be concentrated in a limited area. Fertilizer can be more efficiently applied to suit the growth status, and cultivation facilitated. For instance, in the case of plants mauring fruit one would withhold fertilizer until it was picked, and cultivation, if necessary, could be done extra carefully.

Fertilizing—Special Treatments.

This is a subject which at the moment it is easier to generalise upon. Modifications in detail are likely to be made to suit the wide variations in North Queensland soils. Also, war conditions have already resulted in some ingredients becoming scarce and expensive.

However, it does not seem that the method of fertilizing with a water-soluble mixture in the leaf bases will be displaced in principle, as there appears no better way of applying fertilizer to established pineapples. Each plant receives a small quantity which gradually dissolves and becomes immediately available to the plant. By this method the fertilizer is not spread amongst the plants, as this has been proved less effective and to entail considerable waste. The rate of application is calculated at so much per thousand plants and not at so much per acre. Of course, size of hands will vary between individuals, but on an average one handful to four plants will work out at 40 to 50 lb. per thousand, and one to six plants at about 30 lb. per thousand. If a few amounts are weighed out the rate of application can be checked and consistency very quickly attained. The aim is to place the fertilizer exactly into the lowest leaf bases. It may be said that irregularity in plant development can often be traced to unequal dosage. Light 2-gallon buckets have been found by experience to be the most convenient fertilizer containers.

The nutrition of a plant such as the pineapple has been the subject of much study. The indications are that the number of fruitlets is irrevocably determined by the nutrition of the plant up to the time the embryo inflorescence is formed at the growing point. Thus when the plant has been adequately nourished and the growth status is good, there will be a large number of fruitlets. Subsequent nutrition can only affect the development of the fruitlets. This explains why the fruit produced by planting an over-large sucker is so small, since its nutrition was arrested and the inflorescence formed before it could properly establish itself. Therefore, the importance of early fertilizing is evident.

The first application should be given shortly after planting, so as to encourage as quickly as possible a wide spreading leaf growth. From 30 to 40 lb. of a complete mixture per thousand plants is the usual

dressing. One or two more applications of about 40 lb. per thousand will generally be necessary before the crop is picked. For December-planted pines in the Townsville area, one about March after the rains and another in early spring would usually be correct.

Acetylene gas will force young plants into flower. If it is used with judgment and a knowledge of local conditions it can be of considerable value to the farmer. By a skilful manipulation of time of planting, acetylene, and fertilizer, the crop can be harvested at a predetermined time; also, stand-over fruit can be largely eliminated by treating all plants which have not flowered with the majority. With irrigation in addition even greater control can be established. For tropical conditions the acetylene solution is prepared by dropping a piece of carbide as large as a hen's egg into a kerosene tin of water. As soon as the effervescence has finished it is ready. Approximately 2 oz. is poured into the heart of each plant. If rain falls within twenty-four hours of application, the result may be uncertain and the application should be repeated. This treatment has no adverse effect on the plant or its progeny. The only proviso is that the plant shall be of sufficient development; otherwise the fruit will be small. As a general guide, it will take six to seven weeks from treatment to flowering in the case of Smoothleafs and four to five weeks for Roughleafs, and sixteen to seventeen weeks from thence to picking.

When the soil is not sufficiently acid, sulphur will usually make it so. Some heavy soils will not respond to any reasonable amount of sulphur, but with sandy loams 3 to 4 cwt. per acre is generally sufficient. Advice should always be obtained before a soil is sulphured. Here it should be remarked that the use of ordinary agricultural lime is, in general, harmful to pineapples.

In those cases where sulphur cannot be used and it is obvious that pineapples are lacking iron, it will suffice to spray with a weak solution of iron sulphate at the strength of 6 lb. to 25 gallons, this quantity being sufficient for 1 acre. A very fine mist jet must be used and only a light spray given.

Picking and Marketing.

Picking and handling a big crop requires good organisation to enable it to be done quickly and without damage to the fruit. Short rows and well-spaced tracks help a lot. A good packing place that can be kept clean and tidy speeds up work.

Colour by itself is not a true guide to maturity; climatic conditions render the colour of a mature pineapple very variable. Development of the fruitlets is more reliable, and should vary a little according to the distance of the market. Unless fruit is to be consumed at once, there is a definite advantage in cutting it instead of breaking it off the plant.

Fruit for market must look good as well as be good, and naturally every care is taken not to bruise it, to grade it well, and to pack it neatly in clean cases. A little woodwool is the best packing and looks well.

It is important also to pack the fruit when it is cool and to keep the packed cases as cool as possible during transit.

Diseases.

Pineapples in Queensland are little troubled with diseases and pests in the field. "Wilt" formerly was a serious trouble, but this has been almost entirely eliminated by a suitable acid reaction in the soil and adequate fertilizing. The few scattered cases of wilt in an otherwise healthy plantation are almost invariably due to planting a sucker which was too old.

Black Heart affects the fruit picked about May in North Queensland. This at present is believed to be due to cutting off the plants' water supply by too drastic cultivations at a time when it is maturing a fruit which was formed during the extremely favourable growing conditions of the summer rains.

Sunburn can cause the loss of much fruit. An effective preventive is either a paper sleeve or a tuft of woodwool placed on the fruit, particularly where it is exposed to the western sun.

The fruit rots which become noticeable in transit and in the market are due to organisms entering the fruit tissue through scratches or bruises, and the elimination of all sources of minor damage and clean hygienic conditions in packing operations will reduce them to a minimum.

These are the chief troubles met with; more detailed information on these and others can be obtained from the Department of Agriculture and Stock.

QUEENSLAND SHOW DATES FOR 1941.

May.

Murgon	15th to 17th
Beaudesert Show	14th and 15th
Beaudesert Campdraft	16th and 17th
Warrill View	17th
Mitchell	21st and 22nd
Barcaldine	21st and 22nd
Biggenden	22nd and 23rd
Blackbutt	23rd and 24th
St. George	23rd and 24th
Charleville	27th to 29th
Ipswich	27th to 30th
Kalbar	31st

June.

Wowan Bushman's Carnival	6th
Maryborough	Postponed
Lowood	6th and 7th
Childers Patriotic Carnival	9th and 10th
Boonah	11th and 12th
Bundaberg	12th to 14th
Gin Gin Horse Show and Carnival	16th and 17th
Gladstone	18th and 19th
Rockhampton	24th to 28th
Toogoolawah	27th and 28th

July.

Mackay	1st to 3rd
Proserpine	4th and 5th
Bowen	9th and 10th
Charters Towers	10th to 12th
Nambour	10th to 12th
Ayr	11th and 12th
Townsville	15th to 17th
Laidley	16th and 17th
Rosewood	18th and 19th
Ingham	18th and 19th
Cleveland	18th and 19th
Cairns	22nd to 24th
Gatton	23rd and 24th
Innisfail	25th and 26th
Atherton	29th and 30th
Crow's Nest	30th and 31st

August.

Pine Rivers	1st and 2nd
Home Hill	1st and 2nd
Royal National, Brisbane	11th to 16th

September.

Imbil	5th and 6th
Canungra	6th
Pomona	12th and 13th
Rocklea	13th
Beenleigh	19th and 20th

A Simple Farm Level.*

MANY jobs on the farm call for the use of a level; for drainage and soil erosion jobs this is essential. A simple piece of equipment which is most useful in this respect is described by H. B. Roe of the University of Minnesota and is illustrated below. It can be made by any handy-man on the farm.

The material required is—

A carpenter's 24-inch wooden level of good grade.

Two peep sights.

A pine table 10 inches square with tripod legs.

Several thin pine wedges.

A rod of clear white pipe 1½ inches to 2 inches wide and 10 feet to 12 feet long, and marked in feet, half feet and quarter feet, with blue or black crayon.

Three 3-inch heavy tee hinges with screws and table.

The accompanying figures and table illustrate how the unit is built and operated. The following points are *absolutely essential* and should be kept constantly in mind:—

For each position of the levelling instrument at least two readings must be taken—a backward sight, or "backsight," on the last point read at the last preceding position of the level; and a forward sight, or "foresight," on the new and unknown point. Bear in mind that a backsight is a reading on an old point the relative elevation of which is already known, while a foresight is a reading on a new point of which it is wished to know the relative elevation. The names backsight and foresight, therefore, have nothing to do with the actual direction in which one may be looking, as, after the backsight has been read for any given position of the level, foresights may be read on any number of new points lying in any direction from the levelling instrument.

One should never try to take shots over 6 rods or 100 feet long in any direction with this type of level, and a shorter maximum distance is desirable.

If the bubble is not at centre, bring it there just before taking each reading. The wedges are for this purpose. Set the table in such a position that you do not need to use more than one wedge at a time.

The method of levelling shown in Table 1 and Plates 79 and 80 is applicable to any type of levelling instrument with which readings are obtained by sighting at a graduated rod.

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* Adapted from *New Guinea Agricultural Gazette*, August, 1940, and reprinted from *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, Queensland), April, 1941.

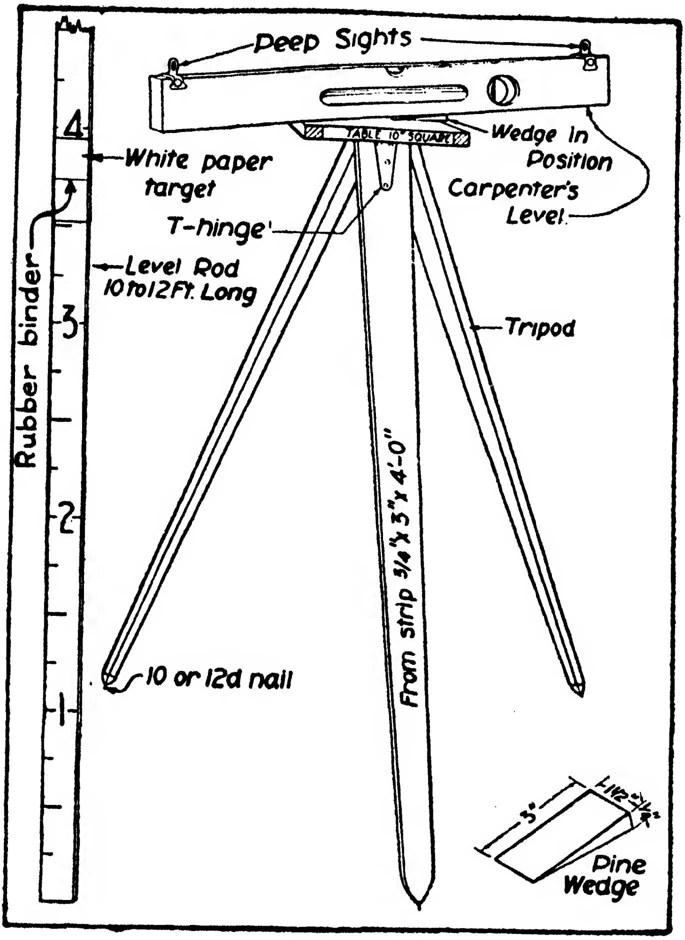

Plate 79.

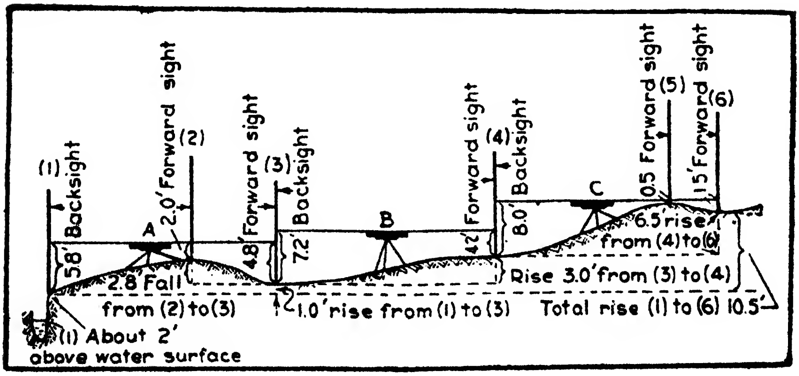

Plate 80.
Illustrating the construction of the level described on page 382.

TABLE 1.

SYSTEM OF LEVEL NOTES FOR DIFFERENTIAL LEVELLING.

Point No.	Position of level.	Backsight.	Foresight.	Difference of Level. From last point.	Difference of Level. From last Backsight.	Difference of Level. Total from Point No. 1.	Description of Points.	Explanation of Computations.
1	A	5·8					Starting point on ditch bank	
2			2·0	+3·8	+3·8	+ 3·8	Top of knoll	All differences = backsight on No. 1 — foresight on No. 2
3			4·8	−2·8	+1·0	+ 1·0	Bottom of pocket	First difference = difference between foresights on No. 1 and No. 2. Other differences = backsight on No. 1 — foresight on No. 3
3	B	7·2						
4			4·2	+3·0	+3·0	+ 4·0	Foot of steep slope	First two differences = backsight on No. 3 — foresight on No. 4. Total difference =5·8 +7·2 — 4·8 — 4·2
4	C	8·0						
5			0·5	+7·5	+7·5	+11·5	Top of knoll	First two differences = backsight on No. 4 — foresight on No. 5. Total difference = 5·8 + 7.2 + 8·0 — 4·8 —4·2 — 0.5
6			1·5	−1·0	+6·5	+10·5	Bottom of pocket	First difference = difference between foresights on No. 5 and No. 6. Second difference = backsight on No. 4 — foresight on No. 6. Total difference = 5·8 + 7·2 + 8·0 — 4·8 — 4·2 — 1·5 = 10·5

H.W.K.

Grow More Sudan Grass!

BY N. J. KING.*

IN Southern Queensland—for which district these notes are primarily written—the normal dry spring is accompanied by bare paddocks and insufficient grass for farm stock. In consequence the old standby, cane-tops, is the bulk and basis of the horse ration during the harvesting season. Even after the season is finished many growers utilize old ratoons for horse feed. Such old ratoons are volunteer, unfertilized and generally neglected—producing only poor feed in small amount, but occupying high priced, assigned land which should surely be producing more valuable crops.

Sudan grass is one of these valuable crops which will ensure a better return to the grower than any volunteer ratoons and which will also put farm horses in finer working condition than will the cane top. Sudan grass (*Sorghum sudanense*) is a hardy, annual, summer-growing grass, its natural habitat being in tropical North Africa. It is, as its botanical name implies, related to the common sorghums, but is quite different in appearance and habit. It is a free-stooling plant; the stems sometimes reach a height of 10 feet, but are only from one-eighth to one-quarter of an inch in diameter. Leaves are approximately half an inch wide. There are no underground root stocks such as characterise the Johnson grass and it never becomes a pest in cultivation.

Sudan grass is quite drought-resistant and is capable of producing large crops in areas of light rainfall. It must be remembered, however, that a closely seeded crop of Sudan grass requires a considerable amount of plant food, and a grower cannot expect a successful crop on poor land unless the crop is fed in the same way as sugar cane. The crop is generally sown broadcast at the rate of 12 lb. of seed per acre. Lighter seeding will result in a coarser stemmed grass, less attractive to stock. It makes a remarkably good quality hay, very palatable to stock, and cures easily over a period of four to five days after cutting. It is generally harvested when in full flower.

It is found that Sudan grass hay at the Sugar Experiment Station at Bundaberg has kept its quality excellently in the stack for up to two years. The hay does not become dusty or in any way deteriorate in value; it chaffs well and is highly relished by the horses. American authorities publish results of mixed seedings such as Sudan grass and soybeans; the latter, being a legume, improves the feed value of the resultant hay crop. Such a mixed seeding was tried here this summer but with indifferent success. Sudan grass grows so vigorously during the hot humid weather in Bundaberg that it appears to crowd out the soybean. Well developed soybean plants were found all around the edges of the field where they obtained sufficient light, but inside the field they were stunted and choked out.

It would be rather enlightening—as an exercise in farm costing—to calculate what cane tops cost the grower during the harvesting season. Cane tops do not keep well, so are normally collected daily and chaffed up each evening. This means that every day labour is employed in picking up cane tops, carting to the barn, chaffing up and placing in feed boxes. What an expenditure of valuable time!

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* In *The Cane Growers' Quarterly Bulletin*, April, 1941.

To illustrate how such time can be saved the writer sets out below the practice in vogue at the Experiment Station and the system of stock feeding employed. Every harvesting season certain cane blocks are ploughed out in their normal rotation. Some of these blocks are required for February planting, so they are seeded with Poona pea. Others are required for spring planting the following year. One such block—usually about two acres—is seeded with Sudan grass; the seed is harrowed in and the block rolled to flatten down cane stools which may afterwards interfere with the mowing of the crop. As the Sudan grass follows a final ratoon cane crop the soil is generally deficient in nitrogen, and an application of 100 lb. of sulphate of ammonia per acre is made when the grass is about nine inches high. No other fertilizer is used. Seeding is carried out in December. During the following two months good rains can normally be expected. The first crop is usually seven to eight feet high in about eight weeks from seeding and is cut when in full flower. This is cured and carted to the barn. Cost of hay from the *two* acres is calculated as follows (on the basis of one unit of labour):—

	£	*s.*	*d.*
24 lb. of Sudan grass seed	0	10	0
Sowing and harrowing (4 hours)	0	7	8
Rolling (4 hours)	0	7	8
Sulphate of ammonia (200 lb.)	1	9	0
Mowing (4 hours)	0	7	8
Raking and cocking (10 hours)	0	19	1
Carting and stacking (28 hours)	2	13	4
Total	£6	14	5

It is conservatively estimated that at least six tons of cured hay were obtained from this cut, so that the cost per ton of hay was £1 2s. 5d. But we must not forget that Sudan grass ratoons and the ratoon crop will be much cheaper since it eliminates the cost of seed, sowing, harrowing and rolling, which amount collectively to £1 5s. 4d. or 4s. 3d. per ton. So, assuming that the ratoon crop is as heavy as the plant crop, the hay from it will cost only 18s. 2d. per ton.

The hay is now in the barn, and the grower can look forward to a few wet days during March and April when he will be unable to do any field work. During such days the hay can be chaffed, and when the harvesting season arrives the stock food is all ready to place in the feed boxes—no picking up tops and carting and chaffing them at a time when every farmer is busy and when every hour lost is money lost.

The above scheme is not a theoretical layout; it is a practical plan which has been in operation on the Experiment Station for some considerable time, and during that period we have not bothered to collect a single cane top for farm animals. On the Experiment Station we also have a small lucerne block which is valuable in supplementing the ration, but this is not a prime essential. During 1939 the lucerne block was out of production and the stock carried on with the Sudan grass hay, molasses and a small ration of grain, and were never in better condition.

It will be readily appreciated what a valuable adjunct to farm economy the above scheme provides. Fallow cane land is used instead of allowing it to remain idle until the following spring, the heavy growth of Sudan grass keeps it weed free, and the cost of the excellent hay is ridiculously low when compared with market prices. Sudan grass is also an excellent silage crop, either chaffed or stacked.

Plate 81.

A YOUNG CROP OF SUDAN GRASS, BUNDABERG SUGAR EXPERIMENT STATION, 1941.

It should be pointed out that the yields given above are for growth under natural rainfall conditions. No irrigation water is used on this crop. At least three crops can be obtained if the field is sown in December; the Sudan grass ratoons strongly, but may need sulphate of ammonia on each cut. The need for this plant food is made evident by the yellowing of the crop.

(NOTE.—Certain precautions should be observed in the planting and utilization of Sudan grass crops. At certain stages of growth Sudan grass occasionally contains traces of hydrocyanic acid and care should always be exercised when feeding it to stock green. Since it hybridises very readily with other varieties of sorghum (including Johnson grass) seed should only be obtained from a dependable source; incidentally, such hybrids are much more likely to contain hydrocyanic acid than true Sudan grass. Finally, Sudan grass acts as a host plant for the corn aphis and therefore its cultivation near cane will tend to increase the rate of spread of mosaic disease in susceptible varieties such as Q.25.—Ed.)

PASTURES UNDER IRRIGATION.

Much important work is being done at Leeton, in New South Wales, to find out the best temporary and permanent pastures for irrigation areas. No fewer than 265 rows of species of grasses and legumes are under test at Leeton, and most of the world's improved types are included. So successful have many of the pasture experiments and larger demonstration areas on the Murrumbidgee Irrigation Settlement proved that many farmers now possess fairly big acreages of watered paddocks carrying sheep and cattle throughout the year. As to the palatability of these pastures, the stock make their own choice. Sheep grazed canary grass (*Phalaris tuberosa*) and lucerne greedily, and then ate in order of preference the clovers, perennial rye, and cocksfoot.

Rubber Belting on the Farm.

ON cane farms there is a substantial amount of belting used, notably where irrigation is practised, but also wherever the tractor is used as a source of power to drive stationary units. Cane growers should be interested in a bulletin* prepared recently by a British agricultural engineer dealing with the subject of rubber belting. The main features will therefore be reviewed.

Rubber belting consists of a cotton or canvas duck treated with rubber. It has a long life, is very flexible and runs easily round small pulleys, whilst its resistance to weather makes it suitable for use in exposed positions.

Correct Size.—It is important that belts be the correct size for the job in hand. It is better to be too large than too small, but an excessive margin in this respect means a waste of money and power. Generally speaking, belts should be broad and light, rather than narrow and heavy, but the following factors have to be considered:—

1. Power to be transmitted.
2. Speed of belt in feet per minute.
3. Width of pulleys and diameter of the driven pulley.
4. Length of drive and whether belts are crossed or open, horizontal or vertical.
5. Weight, width and number of plies of the belt.

As many of these factors interact, it is not possible to give a simple rule for use in all cases, but the following will be a useful guide:—To find the width of the belt required, multiply the horse power by 1,100 and divide by the speed of the belt in feet per minute. To calculate the belt speed approximately, multiply the r.p.m. by three times the diameter of the pulley in *feet.*

To obtain an approximate idea of the horse power which a fairly heavy rubber belt should be able to transmit, multiply the number of plies in the belt by its width. The answer will be fairly accurate when the belt is running at the rate of 2,400 feet per minute. For other speeds, the horse power is nearly in direct proportion. With a light belt, the safe horse power will be three-quarters of the width multiplied by the number of plies. The horse power transmitted is decreased 10 to 15 per cent. by small pulleys, while it would be reduced one-third to one-half if the drive were vertical. With irregular loads, the *maximum* and not the average load must be considered.

Speed of Belts.—Generally speaking the slower the speed of the belt the wider and heavier it should be than if run fast on large-diameter pulleys. It is not necessarily true that slower speeds prolong the life of the belt. Generally speaking, speeds of 2,000 to 3,000 feet per minute give best results. The higher belt speeds can be used to advantage on large-diameter pulleys, as with a smaller pulley centrifugal force tends to reduce the grip and cause slip. For most power units on the farm it is necessary to have a small pulley: in that event, then, the employment of a comparatively wide belt is recommended.

* "Rubber Belting on the Farm," by J. E. Newman, R.P.A. Bulletin No. 13, June, 1940.

Drives.—Long horizontal drives are most efficient, but very long drives are costly. The drive or "tight" side of the belt should be on the bottom wherever possible. This is most important with substantial differences in pulley size and short drives.

Vertical drives, which should be avoided wherever possible, are better short, as the weight of the belt increases the tendency to slip on the bottom pulley. A belt as thin and wide as possible should be used and top drives are best. Tight belts waste power and increase belt and bearing wear. Jumping off the pulleys or slipping from side to side are signs of overloading, though they may also be caused by faulty alignment of pulleys. Crossed belts grip better than open belts, and can be used for shorter centres.

Number of Plies.—There may be a few or many, but most agricultural work can be done with the medium-class belt. The strength and weight of the belt depend on the number of plies, but this should be related also to the width of the belt and the diameter of the pulleys. Belts up to 3-inch widths should have two or three plies; 3- to 5-inch, four plies; and 5- to 8-inch, five plies. Bending of a belt around a pulley stretches the outside more than the inside, and this sets up strains in the material, but so long as the belt is not overstrained no harm results. The thinner the belt and the larger the pulleys the less is the strain. Thin, wide belts running at high speeds tend to run in waves on the slack side; this can generally be cured by using a thicker belt. Satisfactory results usually follow if the number of plies is half the diameter of the pulley. However, a 2-ply belt may be run on an 8-inch pulley, but running a 4-ply belt on a pulley less than 8-inch diameter should be avoided, unless the belt is of special construction for small pulleys; there will, of course, exist differences between belts of different manufacture, in respect of both strength and flexibility.

Belt Fasteners.—In agricultural work the Alligator type and Jackson plate fastener are most common. The former can be used on all types, but the latter should not be employed if the belt has to travel around small pulleys, and cannot be used with a jockey pulley. A square should always be used when cutting a belt, and a punch employed for making the holes for plate fasteners.

Belts can be made endless by the makers, or it can be done by cutting the belt in steps, allowing 3 to 4 inches for each ply, and cementing with rubber cement. Three coats of cement should be used, each being allowed to become tacky before the next is applied, and the two ends must be fitted closely and kept pressed together under weights until well set. Finally, small rivets should be inserted, using a belt punch to make the holes.

Endless belts are preferable wherever possible. They cannot be used where the length of the drive is fixed, or on pulleys running between bearings. Belts should be cut 1 per cent., or $\frac{1}{8}$ inch per foot, shorter than their length measured over the pulleys. For vertical drives this allowance should be increased by one-half, while for very long horizontal drives the allowance should be decreased by nearly one-half.

Pulleys.—These must be wider than the belts which run on them. Allow $\frac{1}{2}$ inch or more with narrow pulleys, and 10 per cent. with wide belts. A crowned wheel is bigger in diameter at the centre than at the sides, and this tends to keep the belt on the pulley. Too much camber

is harmful to the belt, except at low speeds. Flanged pulleys are useful in special cases, but flanges or guides should not be used to retain the belt on pulleys that are out of alignment. A belt should run truly if the pulleys are lined up correctly, both horizontally and vertically. If it does not the belt may not have been cut squarely or the fasteners may be fitted incorrectly.

The ratio of the diameters of two pulleys working together should not exceed six to one. A long drive is advantageous if this cannot be arranged; if not, the use of an extra wide belt or the use of V belts should be considered. Pulleys should be kept clean, as lumps of dirt or belt dressing injure the belt.

Persistent slip on the pulley may be caused by bolting or rivetting a piece of rubber belting to the face of the pulley. The holes should be countersunk on the pulley face, and great care taken that the bolt or rivet heads do not project.

V Belts.—These are very successful for short drives, and may be used with centres which would be impracticable with ordinary belts. They are run in grooved pulleys, the sides of which are 40 degrees. The groove must be deep enough to make it impossible for the belts to "bottom," which would quickly wear them out. They may be run off the flat of a flywheel or large pulley to drive a small grooved pulley. A working rule for belts running on grooved pulleys is 3 horse power per belt at speeds in the neighbourhood of 3,000 r.p.m. They are made in standard lengths, and can only be used where an endless belt can be utilized.

Maintenance.—New belts often slip due to the surface bloom or dusting powder they retain. This usually disappears quickly. Rubber belting is permanently flexible and does not, as a rule, need dressing. Stockholm tar and resin are harmful and should not be used. If the surface becomes glazed and hard, a light dressing of castor oil or washing with soap and water or methylated spirits will prove beneficial. Too much oil will damage the rubber, and it should be applied sparingly by using a soaked cloth or waste against the belt. Direct sunlight is harmful to rubber and belts thus exposed should be removed when not in use.

—H.W.K. in *The Cane Growers' Quarterly Bulletin* for April, 1941.

Silage from Sugar Cane Tops.

BY P. J. SKERMAN.*

A DROUGHT occurs in Queensland on the average once every six or seven years and shorter dry spells occur frequently between these periods. There has been a growing fodder consciousness over the past few years and its conservation has been sponsored by the Department of Agriculture and Stock, the Agricultural College, the Royal National Association, the "Queensland Country Life," and the local newspapers. In spite of this, there is a terrific amount of potential fodder destroyed or otherwise lost in Queensland each year.

A case in point is the almost universal practice of burning off sugar-cane tops and trash each year after the harvest to facilitate ratooning operations or preparation for the next crop. This material is made up largely of the sugar-cane top which is still in the green state at the time of cutting. Quite apart from the loss of potential humus this represents a loss of animal fodder which would be a valuable accessory in time of shortage of natural grazing.

From weighings carried out at the Agricultural College during 1940, it was found that the green weight of the cane top at the time of cutting was from one-third to one-half that of the cane cut from the same stem. Possibly the figure would be somewhat lower as a Queensland average. From the cane tonnages issued by the Director of the Bureau of Sugar Experiment Stations for the 1939 crop, it is noted that 6,000,000 tons of cane were harvested. This then represents possibly 1,500,000 tons of cane tops. Taking the cane grown in the Central and Southern dairying areas, viz., Mackay, Bundaberg, Maryborough, and Nambour as 3,000,000 tons, there are 750,000 tons of cane tops available. Admittedly, quite a good deal of the cane is burned before harvest and there is a labour shortage during the crushing season, but it still cannot be denied that there is a considerable wastage of potential fodder.

A perusal of the rainfall incidence of the dairying districts in the cane areas will show that there is a general scarcity of rain during the winter months from June until October, when supplementary feeding may be necessary.

From the above consideration it was thought desirable that an attempt should be made to make cane-top silage and examine its feeding value. A small area of cane at the College, comprising the varieties P.O.J.2878, Co.290, P.O.J.213, Oramboo, and P.O.J.2725 was consequently harvested and the tops ensiled in July, 1939, in a shallow pit silo, 6 feet deep and 12 feet in diameter, excavated in the bank of the Lockyer Creek. A composite sample was chaffed and forwarded to the Agricultural Chemist of the Department of Agriculture and Stock, who kindly agreed to carry out an analysis. The tops were packed as uniformly as possible in the silo and built 3 feet above the ground. After a few days of settling, more were added and 18 inches of soil placed on top to seal the silo. Considerable sinking took place as the silage settled down and fermentation set in and additional earth had to be placed on top. The temperature taken from the middle of the silo at no time exceeded 95° F.

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* Agriculturist, Queensland Agricultural College, in *The Cane Growers' Quarterly Bulletin* for April, 1941.

The silo was opened in May, 1940. It was found that there was a wastage of 18 inches around the sides and on top of the silo, but the silage in the middle of the mass was of excellent colour and slightly acid in flavour. Owing to the small size of the silo, the waste represented nearly 50 per cent. loss, but with a normal trench silo of 60 to 100 tons capacity the proportionate loss would be much less.

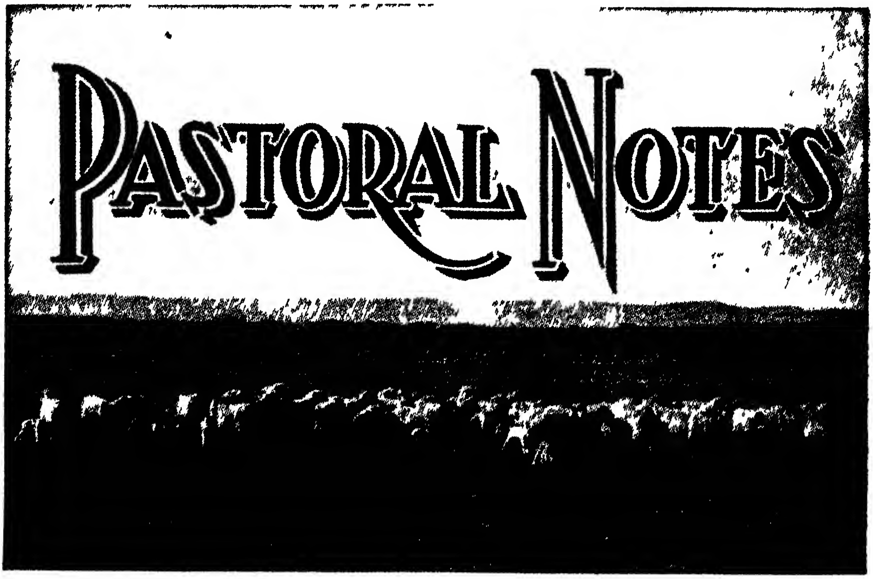
The silage was fed to the dairy cattle and they ate it readily with no harmful effects. A sample was also chaffed and forwarded to the Agricultural Chemist for analysis; he supplied the following figures:—

—	Green Tops.	Ensilage.
	Per Cent.	Per Cent.
Moisture	76·1	76·3
Crude Protein	1·8	1·4
Crude Fat	0·30	0·26
Crude Ash	3·10	3·66
Crude Fibre	7·60	8·55
Crude Carbohydrate	11·10	9·86
Lime	0·15	0·09
Phosphoric Acid	0·12	0·10

Unfortunately, no legume was available at the time for ensiling in conjunction with the sugar-cane tops. This would undoubtedly have provided a better feeding mixture. However, it was sufficiently demonstrated that cane-top ensilage can be easily made and that the tops should be utilized whenever it is possible to find the time and labour for doing the work.

Plate 82.

A HOME-MADE TRACTOR.—An ingenious orchardist's ploughing plant in action on a near North Coast farm.



The Horse's Mouth.

THE horse has two dentitions—a milk dentition, and a permanent dentition. The incisors and premolars are milk teeth, and are replaced in due course by permanent teeth

The centre permanent incisors appear from two and a half to three years old, the lateral from three and a half to four years old, and the corner ones from four and a half to five years old, when the animal is said to have a full mouth. The tushes seldom appear before the age of four years, are well up at four and a-half years, and are level with the corner incisors at five years In mares, these canines seldom appear.

Occasionally the milk teeth are not shed before the appearance of the permanent ones, and they may interfere with their normal growth, pushing them out of position. Removal of these milk teeth sometimes is necessary, and this is done with small forceps, or even by levering them sideways with a strong knife blade. Never break them off. After their removal the permanent teeth soon straighten up.

Many horses, particularly aged horses, lose condition because of pinnacles and sharp edges on the molars, and which may prevent the proper mastication of food. These irregular projections are found on the outside of the upper and the inside of the lower molars, sometimes cutting into the cheeks and tongue, causing painful sores; or one molar may be found to have grown too long through decay of the opposite one and consequent lack of wear, that it prevents the other molars from meeting, and the horse is unable to grind its food.

An affected animal shows distress in chewing by holding its head on one side to chew, and eventually dropping the half masticated bolus from its mouth.

Other evidences of distress are an objection to the bit being put into its mouth by tossing the head, or by "running away from the bit" when pressure is applied to the reins.

Indigestion and colic are usually the consequence of this condition.

The remedy lies in the careful and patient use of the tooth rasp, which is used in conjunction with a mouth gag, care being taken not to destroy the natural bevel of the teeth, for it must be remembered that mastication is performed by movement of the bottom jaw, the bevel of the teeth providing the resistance, so that food may be properly ground. After the teeth have been levelled, the mouth should be swabbed out with a solution of borax and water, and a suitable tonic given with feed such as—gentian root powdered, four parts; sulphate of iron powdered, two parts; nux vomica powdered, one part. Two heaped teaspoons of the mixture should be given twice daily in a small quantity of dry feed.

CLASSING THE EWE FLOCK.

Many grazing properties in Queensland are usually stocked well up to their carrying capacity and, with the coming crop of lambs to be provided for, some reduction in numbers may be necessary. It is better to own a flock of good ewes than a flock containing a mixture of good and bad stock. Besides being more profitable, it should give the owner far more satisfaction to have a flock as near as possible to uniformity in type and which will cut a heavy fleece of good quality wool.

On most large holdings classing the ewe flock forms part of the station routine, and there is no reason why smaller flocks should not be classed in the same way.

Just before shearing is the most suitable time to do the classing and, usually, the flock can be classed in three groups to advantage. The tops should consist of all the large-framed, deep-bodied ewes carrying a covering of even type, well grown, and showing the character and colour typical of the breed. Ewes selected for the main flock should be as free from fault as possible, but need not be so even or up to the standard of the tops. The third class will be the culls, including light cutters, ewes producing inferior wools in quality or colour, and ewes rejected for defective frames, weak constitution, or objectionable folds or wrinkles. The rams to be mated with them should be classed in the same way, the best being selected for the top line. All culled ewes should be fattened and sold as soon as possible; likewise, those cast for age.

CARE OF THE DIP.

Cattle owners in ticky country often neglect their dipping vats. Consequently, they lose money without realising it, for cattle dipped recently in a dirty vat lose their bright, clean appearance, which helps the seller when the bidding in the sale ring is brisk.

In the course of time a dipping vat will accumulate a considerable quantity of filth, which settles slowly on the bottom as a deposit of sludge. It may become so bad that an owner is forced to empty the vat and is then put to the expense of recharging.

This can be avoided by cleaning the vat periodically. For this purpose, a kerosene tin is cut in half diagonally to make a scoop, which is attached to a handle with wire. Small holes are cut in the bottom and sides. After dipping cattle the surface of the fluid may be skimmed with the scoop and floating hair and dirt removed. This helps to keep the vat clean for a long time.

After dipping the sump should also be cleaned and dirt prevented from accumulating.

A white mark should be placed on the side of the vat to show the height of the fluid. It will be noticed, particularly in hot weather, that evaporation is very rapid, and the surface of the fluid will fall far below this mark. Before next dipping, water may be added until the dipping fluid is again at the correct level. It is only the water that evaporates—not the concentrates.

THE SMALL FLOCKOWNER'S WOOL.

The wool-marketing scheme conducted by the Department of Agriculture and Stock in the interest of the small flockowner continues to grow steadily in usefulness and popularity. The scheme is open to graziers with 1,500 sheep or less, who may send their whole clip for classification and sale. In addition, bags, butts, fadges, and odd lots are accepted from any holding.

Wool produced from British breeds of sheep is also accepted from any holding.

An advance of 60 per cent., without interest, of the estimated value of the wool is forwarded to growers of under 1,500 sheep, on receipt of the wool into store. The financial benefits to farmers with small lots of sheep are undoubted. No matter how small the quantity of wool, the farmer is assured of receiving its full market value.

The charge for classing is 10s. a bale. Other charges are the usual brokers' charges, such as insurance, commission, and handling.

HYDATIDS.

The cause and far-reaching effects of hydatid disease in both man and domesticated animals does not appear to be recognised as widely as its importance warrants. It is caused by the larval stage of a tapeworm which, in the adult stage, is found in the dog, and affects human beings, cattle, sheep, and pigs. This larva or hydatid consists of a fine enveloping membrane, enclosing a watery fluid, and containing numerous tapeworm heads. It is usually found encysted in the liver or lungs of affected animals, although it may infect any of the organs or tissues of the body cavities.

Dogs become infected with tapeworms through eating animal organs or tissues containing hydatids. When these are swallowed, the worm heads are liberated and, attaching to the bowel wall, eventually become a fully developed tapeworm. At various intervals, mature segments containing eggs break off from the tapeworm and pass out of the dog's body with the faeces and foul the pastures, water, or green vegetables, as the case may be. Should the eggs be swallowed by a suitable host, they hatch in its intestines, and, boring into the intestine wall, enter the blood stream to be carried to the various organs and tissues of the body cavities, where they develop into hydatids.

Human beings are infested chiefly through careless handling of dogs. The risk of infection certainly is not as great as in the case of the lower animals; but where there are infected dogs, it is an ever present possibility, through eating uncooked vegetables (lettuce, celery, &c.), or through the drinking of polluted creek water. Hydatid infection in human beings usually has serious and sometimes fatal consequences. This may be caused either by the destruction of healthy tissues in the affected organ or through continued pressure on the affected organ or adjacent vital organs, thus seriously interfering with their functions.

In cattle, sheep, and pigs, fatalities resulting from hydatid infection are not common; but they, nevertheless, are a source of economic loss, arising from the condemnation at the meatworks of affected parts; and, to a lesser extent, from the additional time taken to grow and fatten affected stock.

Tapeworm infestation in dogs may not only seriously affect their health, but may also lower their resistance to other diseases and their value as workers.

To control the spread of hydatids, it is necessary to prevent the tapeworm infestation of dogs. It is essential, therefore, that all organs or parts of animals slaughtered for food, and found to be hydatid-infested, should be destroyed either by burning or boiling down. This is provided for in the Slaughtering Act and Regulations; also the exclusion of dogs from slaughter-yards and butcher shops.

In large towns where all slaughtering operations are under the regular supervision of meat inspectors, legislative provisions are observed more rigidly, and that is the reason for the usually low incidence of tapeworms in town dogs. In the country, however, it is not uncommon for dogs to be allowed access to the offal of slaughtered animals, both on farms and stations. Instances are known where owners have fed infected livers to their dogs. They knew that the livers were not suitable for table use, but thought that they would do the dogs no harm. This practice, obviously, cannot be too strongly condemned.

ROTATIONAL GRAZING.

In the minds of many selectors, rotational grazing seems to be restricted to improved pasture land, or land which has been cropped. That is not so entirely, for much benefit, both to ordinary grassland and to the sheep running on it, may be derived from the periodical spelling of the country and proper flock management.

It is not uncommon to see wethers turned into a paddock off shears, to stay there, possibly, until next shearing to the detriment of the sheep and the pastures.

Sheep benefit greatly by a change of paddock, even when the country is, apparently, in a worse state than that from which they have been removed. Too little is done, generally, on grazing lands to see that, each year, some portion of the country is spelled with the idea of allowing the grasses to seed. Rotational spelling is just as important as rotational feeding. Soil erosion, caused by continuous stocking and overstocking, also should be considered.

Regarded generally, more money is to be made over a period of average seasons by running three sheep and properly looking after and adequately feeding them, than four sheep more or less neglected, either in management or nourishment.

CASTRATION OF COLTS.

The best time of the year to perform this important operation is the spring, when rain has fallen and green feed is available, and before the hot weather has set in.

The colts to be gelded having been yarded over night. it is desirable before proceeding with the operation, to take precautions against losses through infection of wounds. Crude carbolic acid or phenol in a solution of 7 oz. to 1 gallon is a suitable disinfectant, and should be sprayed over the ground and rails of the yard.

All instruments used should be sterilized by boiling for at least ten minutes, and should be wrapped in a sterile towel and kept in a box at the yard until required.

After each colt is done the instruments and hands of the operator should be washed in a weak solution of carbolic acid, this solution being kept in a separate vessel, and only sufficient for each disinfection being poured into a dish for the purpose, and then thrown away. The practice of using a petrol or kerosene tin filled with disinfectant to wash instruments and hands time after time is risky.

For unbroken colts, the rough and ready methods of roping, choking, and throwing as practised on many stations may cause the loss of valuable animals. These losses may be minimised if a crush with side gates is available, so that the colt can be haltered and side lines used on him before the gate is opened to cast him.

The colt, having been cast on his left side, the hind legs drawn up to the shoulders and made fast with half hitches, the fore legs can now be secured with the knees bent to the hind feet.

The scrotum, sheath, and penis should be washed with warm water and soap, care being taken to remove any suety deposit from the penis and the cavity at the end of the penis. The left or lower testicle (the colt being on his left side) is seized in the left hand, and pressed until the skin is tight over it; a bold incision from front to back, parallel with the median line is now made, penetrating the outer skin and the tunica, laying the testicle bare. As the incision is made, the cord should be grasped firmly in the left hand to prevent the retraction of the testicle upwards through the canal. When this happens it is sometimes difficult to recover, and the subsequent manipulation in an attempt to bring it down delays the operation, and causes unnecessary shock to the patient. The knife is now slipped between the anterior and posterior portions of the cord, and the latter (posterior), which the muscle retracts, is cut completely through.

The testicle now lies inert, connected by the anterior portion of the cord, which is composed of blood vessels, and should be drawn out until it is taut, without using force, when the emasculator (if that method is being used) should be used close to the belly, with a slow squeezing movement, taking care that the crushing part is nearest to the belly, and the cutting part to the testicle. The cord should be severed as short as possible, so that it may not hang below the wound, and so cause complications.

The other testicle may now be removed in a similar way.

It is advisable to swab the wound with a solution—1 to 2,000—of chloride of mercury. The ropes may now be removed, and the colt allowed to rise and walk out the yard, so as to be away from dust.

If the operation has been performed carefully, and all antiseptic precautions taken, recovery should be rapid and no further treatment is necessary, but if undue swelling is noted, the wound should be opened with the fingers, after washing the hands with carbolic solution, so that there may be free drainage, and the wound swabbed with disinfectant.

Some bleeding always occurs, but rarely lasts for more than half an hour, but if copious bleeding persists after that time—as is the case when emasculators have been used carelessly—the cord must be found, and the artery tied with silk thread. If the stump of the cord cannot be found, the canal should be plugged with pledgets of tow or wool soaked in muriate of iron of the same strength as obtained from the chemist, which helps to form clots, and so closes the artery.

BELLY WOOL.

It is well worth the trouble of removing fatty ends from belly wools. The skirtings can then go with stained pieces or locks, according to the quality of the wools removed. All stains should, of course, be removed from wether bellies. The difference in the price received from a line of bellies so treated would soon convince any sheepman of the advantage to be derived from a little extra work.

CARE OF FAT LAMBS.

Careful handling of fat lambs pays. Everyone concerned with the marketing of fat lambs, whether in the yard or in transit, can co-operate in the prevention of bruises, abrasions, and other injuries to the animals. Some of the causes of avoidable injuries to fat lambs are—

Over-driving.
Using dogs that bite.
Grabbing the lambs by the wool.
Prodding with sticks, or ill-usage in any other way.
Overcrowding in trucks.
Allowing lambs to fall off the gang-planks during loading and unloading.

CARE OF SHEEP SKINS.

In the aggregate, a heavy loss is caused by carelessness in the treatment of sheep skins on many grazing properties. Butchers' skins are, usually, delivered for sale in good condition.

All skins should be carefully stretched. In hanging, neck and tail should be on the rail. Immediately after the skins are removed they should be thoroughly painted with a disinfectant or poison as a preventive of weevil attack.

In packing skins for market, they should be placed skin to skin and wool to wool.

More care of the skins on the property and a more attractive bundle when sent to market would benefit growers financially; the lump sum thus saved would be a substantial amount.

HOSPITAL PADDOCK FOR FLY-STRUCK SHEEP.

During a bad blowfly infestation graziers are advised, where at all practicable, to supply a hospital paddock for fly-struck sheep. This should be done for two reasons:—(1) The affected sheep may be inspected and dressed when necessary, thus saving many a sheep which would be otherwise lost; and (2) to a very great extent lessening the chances of extra strikes in the flock. A fly-struck sheep is always a menace to others, inasmuch as it is an attraction to flies.

A further precaution in the way of saving the lives of sheep is to shear them. Admittedly there will be some loss, and a considerable one, in the value of the fleece, but a live sheep is better than a fly-blown carcass.

Where the necessary small paddock for a hospital flock does not exist, graziers are advised to consider the cost of providing one as a paying investment.

TAR BRANDING CONDEMNED.

Some stockowners still continue to use a tar brand on sheep, apparently without realising the loss which this practice entails. Wool from tar branded sheep is often sold at a lower price than wool marked with one or other of the several recognised branding fluids, which are harmless and easily emulsifiable. Tar spoils the wool, from which it is very difficult to remove during the process of manufacture.

The grazier who uses tar for branding should, obviously in his own interest, discontinue the harmful and costly practice.

SKIRTING THE FLEECE.

Probably the greatest defect in the get-up of small clips for market is faulty skirting. The usual mistake is to take too much off the fleece. Every pound skirted off the fleece unnecessarily means a loss in money equivalent to the difference between the prices received for fleece wool and for pieces and broken wool. On the other hand, a loss is sustained if a clip is not skirted properly. If it is payable to "free" a wool it should be done. This consists of removing all burr and other vegetable matter from the fleece. If, however, the fleece is so matted with burr or grass seed that it is impossible to "free" the wool, skirting should be very light, and the wool put up and offered for sale as a "burry" or "seedy" line.

An appreciation of these points may mean substantially enhanced returns to the farmer.

WINTER PASTURES.

Several factors should govern the choice of a pasture mixture for winter grazing, including the average winter rainfall of the district, the soil types, the cultivation treatment the land has received, the length of time the pasture is expected to remain, and the aggressiveness of weeds. Once a suitable mixture has been established it must not be considered "fool-proof," but should be managed with due regard to the pasture itself.

Only relatively small areas of winter pasturage will be available on any property, and the temptation to stock these paddocks heavily during the winter months when the "broad acres" are unproductive must be resisted. Such pastures should as far as possible be reserved for cows in milk, for breeding ewes or for fattening stock. The pasture should not be stocked too early in the growing season but must be allowed to make good growth before grazing. When a paddock is ready for grazing the animals should be permitted to graze on it for about an hour each day and they should be removed sooner if they begin to lie down. Camping on the area should be avoided, as the pasture becomes fouled and distasteful to the stock. Sufficient stock should be put on to eat a paddock down within 10 days or so, but the pasture must not be too closely grazed. "Flogging" a pasture of winter grasses and clovers will certainly be harmful. After the completion of a grazing, the harrows or wooden drag should be run over the paddock to scatter the droppings. The pasture must be given ample time to recover and produce good growth before being grazed again. Sufficient paddocks of winter pasture should be provided to permit rotational grazing and to supply green, nutritious feed continuously throughout the cooler months of the year.

Some of the annual winter pasture plants—e.g., Italian ryegrass, Wimmera ryegrass, and prairie grass—are self-seeding, and towards the end of the growing season, pastures of these grasses must be left unstocked in order to permit the seed to be matured and shed. Areas which have been so treated should be lightly harrowed in early autumn to make a seedbed for the establishment of seedlings produced by the self-sown seed.

LATE SOWING OF WINTER PASTURES.

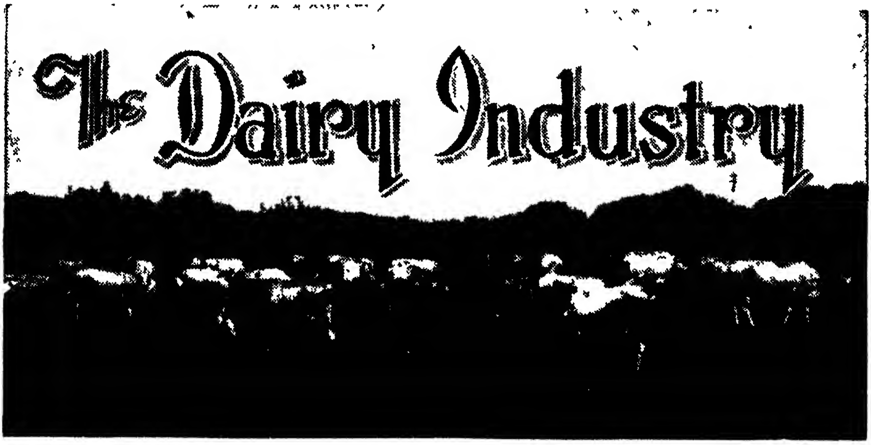
In normal circumstances, winter pastures should be sown at the end of March or during April. The annual species, particularly, require a long growing season if they are to prove a better proposition than the winter cereals. Late May and June sowings of annuals such as Italian ryegrass, Wimmera ryegrass, prairie grass, and berseem clover almost invariably give poor results during mid-winter; although, if ample soil moisture is available, they may provide useful spring feed.

The perennial grasses and clovers usually are slower in developing than are the annuals; and, if sown in late May or June, cannot be expected to provide any great bulk of winter or spring grazing during the year of sowing. However, if the establishment of the pasture is of more importance than the provision of early grazing, late sowings may be done with some prospect of success.

FAT LAMB TRANSPORT.

Complaints of the bruising of lambs consigned to market are not uncommon, but to a great extent the remedy lies in the hands of growers.

The tenderness of sucker lambs is often not appreciated sufficiently, and in many cases they are handled like fat sheep. Sheep, too, may be bruised by bad handling, although not so badly as sucker lambs. It should be remembered that true sucker lambs have never been off the mothers. It is advised, therefore, that if a road journey has to be undertaken, some of the ewes should accompany the lambs to the trucking yards. Untrained dogs should not be used for yarding the lambs. A lamb should never be lifted by the skin. Prodding sticks should never be used. Overcrowding in the trucks should be avoided entirely. In all cases every endeavour should be made to deliver the lambs at the market with the bloom on them. A certain loss in weight and appearance is unavoidable on a long journey, but if the foregoing rules were observed strictly, complaints of bruising would be rare.



Pigments in Milk.

MILK contains two kinds of colouring substances, one of which is soluble in water, and the other soluble in butterfat. The water soluble pigment is called lactochrome and its greenish yellow colour may always be seen in whey during cheese manufacture. The pigment soluble in fat is yellow in colour, and is more interesting and important on account of its presence in butter. It is called carotin, and belongs to a group of colouring substances called carotinoids, which are widely distributed in plants and are also found in many animals. Carotin, for example, is also responsible for the yellowish colour of the fatty tissue and skin secretion of dairy cattle, especially Jerseys and Guernseys. Another carotinoid, which is very closely related to carotin and which is called lycopin, causes the red colour of tomatoes, watermelons, and other fruits, but has not been found to occur in animals or milk.

Carotin is found in all green plants, being manufactured by the plants themselves, but it is not manufactured in the bodies of animals. The presence of carotin in milk fat is therefore due to a direct transfer of this colouring substance from the food eaten by the cow.

This has been proved quite definitely by feeding experiments, which have shown that the amount of carotin in the fat increases or decreases, according to the amount of carotin present in the food. When cows are fed on such foods as cottonseed meal, timothy hay, white corn and yellow corn, the amount of carotin found in milk fat is very low compared with that obtained from cows fed on green lucerne hay, green crops, fresh pasture grass, and similar foods.

This offers an explanation of the seasonal variation in the natural colour of butter, and also indicates why butter from some districts is more yellow than butter from other districts. In those areas with a good annual rainfall and consequently a plentiful supply of green pasture, the colour of butter is always brighter than that produced in the drier parts of the State.

The various breeds of dairy cattle differ with respect to the amount of this yellow colouring substance in butter fat. Guernseys and Jerseys rank first in this respect, with Ayrshires, Shorthorns, and Friesians lower down on the scale. Another interesting feature about this pigment is that, of all the animals whose milk is commonly used for human food, cows alone give milk which has a pronounced yellow colouration of the fat. Milk fat from the goat, ewe, camel, and water buffalo is almost entirely devoid of yellow colouring matter. The fat of human milk, however, is at times distinctly tinted by carotinoids. The reason why such differences occur is not known.

A point of great interest and importance also is the relationship between carotin and vitamins in milk and butter. It has been shown that carotin can be transformed into vitamin A by the cow itself. The yellow colour of butter, such as is often seen in spring and summer-time, is therefore suggestive of richness in vitamins, and vitamin content is one of the best arguments for butter as a fatty food for children and grown-up people.

BACTERIA IN THE BUCKET.

Milk as it comes from the average healthy cow contains comparatively few micro-organisms, and these are for the most part inactive in milk. There are many sources from which the bacteria responsible for souring, bad flavours, and other forms of deterioration may gain entrance to milk. Premature souring is very often caused by the use of milk vessels—pails, strainers, coolers, or cans—which, for some reason, are in a state of disrepair. A single utensil which has become worn or bent with continued use, and has developed cracks or crevices, may harbour undesirable bacteria capable of spoiling milk which has been otherwise very carefully produced.

With the cooler weather, summer troubles are apt to be forgotten; but, if the cause is not removed, they will crop up again with the first hot spell. A thorough inspection of all milk vessels and equipment is, therefore, desirable, repairs or renewals being made where necessary. The seams of cans and pails should be resoldered if they have opened at all, and dents should be straightened out. Where the defect is more serious, there should be no hesitation in discarding the vessel, as it is only false economy to keep it in use.

No ordinary method of cleaning can dislodge bacteria established in very small crevices, for they are well protected, and subsist on the small amount of milk solids left behind whenever the vessel is used. Even steam treatment will not destroy them completely.

Off-flavours, such as tallowy and cardboard taint in both milk and cream, are due to the presence of small amounts of copper and iron, which often come from coolers with defective tinning, or from rusty utensils. These flavours develop rapidly under favourable conditions, such as the exposure of the milk or cream to direct sunlight. They cannot be removed, and it is, therefore, necessary to have any worn surfaces retinned as a preventative. Provided no abrasive is used in the preliminary cleaning—a stiff brush will usually remove milk solids—and no strong chemicals are applied, the tinning should have a reasonably long life.

EFFECT OF DISEASE ON MILK.

The effect of disease on milk from cows is variable. Usually there is an alteration in composition, accompanied by a decrease in yield. Generally speaking, the milk-sugar (lactose) is considerably decreased, while the chloride and ash content increase. Fat may either increase or diminish. Casein is likely to be lowered and albumin increased, whilst the total protein may remain constant. A consideration of one or two important diseases will illustrate the changes that may occur.

Mastitis is one of the commonest diseases in this country, and analyses show that the casein, fat, and lactose are markedly reduced and the chlorides increased, in milk from affected cows. Casein and fat are the all-important substances in the manufacture of cheese, and a deficiency of these constituents in milk means a lowered cheese yield at the factory. The importance of this disease in relation to cheese making is therefore very evident, and only serves to emphasise the need for greater care and vigilance on the part of all concerned in the dairying industry.

Foot and mouth disease is fortunately unknown in Australia, but analyses of milk in countries where it does occur show that drastic changes take place in the composition and yield of milk. One of the most noticeable effects of this disease is a very marked reduction in the volume of the milk secreted often to one-quarter of its normal quantity. The changes in composition depend very much on whether the udder is inflamed or not. If the udder is inflamed, the changes in composition are very similar to those that occur in cases of mastitis. When the udder is not inflamed the fat, protein, and ash are increased and the lactose diminished. The fat may rise to as high as 10 to 15 per cent. (normally about 4.5), the protein to 5 per cent. (normally 3), and the lactose diminishes to 3 or 4 per cent. (normally 5).

It is interesting to find that the composition of milk when a cow dries off is very similar to that from a cow suffering from foot and mouth disease, without inflammation of the udder. Drying a cow off is usually accompanied by a considerable reduction in her feed, together with less frequent milking, and it is suggested that there is a similarity between these conditions and those that occur in some diseases. In sick cows there is a marked decrease in the food intake, and the milkings are apt to become less frequent.

The abnormality of milk and the decrease in yield brought about by these two diseases alone indicate the economic importance of disease in regard to the dairying industry. Anything that the individual farmer may do towards improving the health of his herd will not only be of benefit to himself but to the industry at large.

DOUBTFUL CREAM.

Every factory manager must formulate a policy in regard to the lowest quality cream that can be manufactured into choice quality butter at his particular factory. Modern methods of manufacture and factory equipment have done much to enable the utilisation of cream, which a few years ago would have been discarded. Nevertheless, the dairying industry still offers no exemption to the general rule that the quality of raw materials directly influences the character of the manufactured product. The addition of a few faulty cans of cream to a vat may thus cause the spoilage of otherwise choice quality butter. Only a thorough knowledge of the origin and nature of a given defect can help in determining the fate of doubtful cream.

There is a limit to the capability of machinery and manufacturing technique to offset defects in cream quality, and no factory can afford to slur over defects in the cream received. Any laxity in this respect is really doing the farmer a disservice, for he may remain unaware that better quality cream is required, and take less, instead of more, care on the farm.

First quality butter can only be obtained when the farmer realises that the remedy for cream defects is essentially his responsibility.

EFFECT OF POONA PEA ON CREAM QUALITY.

During a recent visit to a butter factory an offensive odour and flavour was manifest in the cream from some suppliers. One supplier, whose dairying methods were known to be sound, but whose cream was badly affected by the taint on certain days, although of good flavour on other days, was visited with a view to finding out the cause of the taint in his cream. It was discovered that the second-grade cream coincided with the dates on which the stock were allowed to graze in a paddock of Poona pea. Suspecting the legume to be causing the taint, some foliage was boiled with water and a quantity of the extract added to cream. After a while, an odour and flavour similar to that noted in the affected cream at the factory, but in a milder form, were detected.

With the cessation of the feeding of the cattle on Poona pea, the cream supplies have been graded choice at the factory thus affording additional evidence that the Poona pea was the cause of the previous de-grading.

Poona pea is apparently disregarded in other countries as a serious, cream-tainting fodder, but the experience in the district in which the butter factory is situated seems to indicate that dairy farmers should be cautious feeding their milking stock on this crop.

Poona pea, being a member of the legume family of plants, is valuable for dairy stock, as it provides protein to balance the rich carbonaceous, but low protein-content sugar-cane or cow-cane so much used for cow-feeding among the canegrowers, who also are engaged in dairying in the district.

The incidence of fodder taints in dairy produce can often be controlled by herd management. Although no specific feeding tests have been carried out to ascertain whether the taint in milk and cream is decreased according to the periods for which cattle are grazed on Poona pea, it has been observed that, where cattle are not fed exclusively, nor for any considerable time, on this legume, the cream appears to be unaffected. It would appear, therefore, that the taint can be controlled by exercising care in the feeding-off of this crop, and it is recommended to arrange, if practicable, for cattle to be grazed on Poona pea immediately after milking and withdrawn from the paddocks in which this plant is growing at least three hours before the next milking.

FEEDING OF CONCENTRATES.

Farmers are often adverse from feeding concentrates, which impart a flavour or "taint" to the butterfat. Peanut products are a typical example. In many cases the difficulty may be overcome by feeding the material immediately after milking. The animal then is assured of sufficient time, before the next milking, in which it can utilise the constituents liable to give the off flavours.

FAT LOSSES IN SEPARATED MILK.

When milk is passed through a separator there is always a certain proportion of the fat left with the separated milk. The extent of this loss depends on the condition of the milk and the efficiency of the separator. Cold milk is more difficult to separate than warm milk, because the latter is more fluid and the fat globules reach the centre of the bowl quicker.

The separator is a delicately balanced machine which is likely to lose its efficiency without any significant outward indication. Roughening or denting of the discs, vibration of the machine because of insecure foundations, and an over supply of milk to the bowl as a result of a damaged float are among the causes of increased fat losses.

The matters with which the farmer is mainly concerned are the percentage of fat in separated milk, and the proportion of the total fat thus lost.

Some farmers may be amazed to learn that separated milk from an efficient separator seldom contains less than 0·06 per cent. of fat. Results of separator trials carried out by a well-known separator manufacturing firm show fat percentages ranging from 0·06 to 0·07, and accurate analyses in other countries indicate that under normal working conditions, a percentage of 0·12 is quite common. Numerous analyses have shown an average of 0·08 per cent. of fat. The reasons for this loss is that all milks contain a certain proportion of very minute fat globules and only a comparatively small proportion of these are separated with the cream, the major portion being lost in the separated milk. This loss is unavoidable and cannot be appreciably reduced by adjustments to the separator.

Reports of analyses showing percentages of 0·01 to 0·03 should be discounted as worthless, as in all probability such tests were obtained by using the ordinary Babcock test. When applied to such products as separated milk and buttermilk the Babcock test is unreliable. Regulations under the Dairy Produce Acts require that separated milk shall be tested by the normal butyl alcohol modification of the Babcock test. This method gives results comparing favourably with standard analytical methods.

An efficient separator removes about 98 per cent. of the total fat in the milk as cream, the remaining 2 per cent. of the fat being lost in the separated milk. A loss of 1·5 per cent. of the total fat is about the lowest that can be expected under normal working conditions.

DEPARTMENTAL ASSISTANCE TO FARMERS.

When they have trouble with their cows—such as failure to breed, vaginitis, abortion, mammitis—many farmers say nothing about it. Others ask their neighbours, and generally end up by doing nothing, or else buy expensive remedies. When the disease has become serious and the financial loss is heavy, some then decide to seek the advice of the dairy inspector or the Government veterinary surgeon; and when the officer arrives at the farm he is expected to perform a miracle and remedy the trouble immediately.

Officers of the Department are in the district for the farmers' benefit, and farmers are advised to communicate with them at the first sign of trouble.

Contagious abortion and mammitis are notifiable diseases under "*The Dairy Produce Acts*, 1920 *to* 1935."

GRAIN SORGHUM FOR DAIRY COWS.

There is a rather widespread idea that grain sorghum (seed) is much inferior to maize as a feed for dairy cattle. This is far from true. Most of the disappointments from sorghum grain feeding arise from the seed being fed whole. When ground—in the same way that maize is fed as a meal—the value of sorghum grain falls very little short of that of maize grain. Crushing reduces the amount of indigestible material excreted, but fine milling enables the dairy cow to make best use of this valuable concentrate.

For all practical purposes, direct substitution of crushed sorghum for maize meal may be made, and 5 lb. of it may replace 6 lb. of pollard.

Rearing Motherless Pigs.

NEWLY-BORN pigs are frequently deprived of the sow's care through death or sickness, or because the litter is too large. If taken in hand as soon as they are deprived of the sow's milk, there is a very good chance of the pigs being reared successfully by articial feeding. If they are left too long without sufficient food, however, they become weakened and difficult to rear.

Sometimes a large litter is divided into two lots, and each lot is put with the sow separately for a drink at frequent regular intervals. Although this entails a lot of attention, it gives satisfactory results. Foster mothers are sometimes available, and a sow with a small litter may be given some pigs from another sow, provided they are about the same age as her own.

When hand feeding is resorted to, the pigs should be given a warm, dry camping place, and have access to clean pasture. A movable shed in the run is very convenient. In the absence of the sow's milk, which helps to build up a natural resistance to disease, every possible precaution should be taken to prevent infection in the young pigs. A clean and comfortable pen should be a first consideration. Access to pasture assures a supply of vitamins and minerals, which are essential to a complete diet.

A method of feeding which has given very good results with pigs taken from the sow when a day or two old is as follows:—Start the pigs on whole cow's milk fed warm and as fresh as possible, six times daily. After three weeks the whole milk may be gradually replaced by separated milk, and the six feeds daily may be gradually reduced to three feeds daily. When the change from whole to separated milk is being made, a trough of a dry meal containing 90 per cent. of pollard, bran, maizemeal or wheatmeal, and about 10 per cent. of meatmeal should be kept in the pen with food always available to the pigs. This trough must be sheltered and kept dry. A constant supply of drinking water should also be kept before the pigs when they are given the dry food.

In teaching the young pigs to drink, the bottle and teat are neither necessary nor desirable—a shallow dish serves the purpose well. The warm milk should be placed in the dish about ½ inch deep and the pigs taken one at a time and stood in the dish. Then, if the pig is held firmly over the top of the neck, its head can be placed down into the milk, and held there long enough for it to get a taste of milk, but not long enough to allow it to inhale the milk. This operation may be repeated a few times at each feeding. After two or three such lessons the piglets will usually drink readily without assistance and afterwards will give little trouble.

When the piglets are drinking well, the dish may be replaced by a shallow trough. Both the dish and the trough used for holding the milk should be made of metal or earthenware and free of cracks so that they can be cleansed and scalded after each meal. This is most important for the prevention of digestive disorders.

ROUNDWORM IN PIGS.

Frequently, pig farmers ask for an explanation as to why their young pigs do not grow at a normal rate and do not reach bacon weight till, perhaps, about twelve months old. Some also state that losses among their young pigs have occurred at intervals over a number of years.

One of the chief causes of these troubles is a roundworm which is often found in large numbers in the small intestine. When a herd is infested the worms are frequently passed by the pigs, and as they may measure up to 15 inches in length, are easily seen in the dung in the sties. The animals become infested through swallowing an egg which contains a very minute worm. These eggs hatch in the small intestine, and the small worms to which they give rise burrow into the intestinal wall and are carried by the blood stream into the liver and lungs. The young worms then leave the lungs and crawl up the windpipe into the mouth. They are then swallowed, and so reach the intestine once more, and this time they settle down and grow to maturity. The presence of the young worms in the liver and lungs causes serious disorders which may cause death, usually from pneumonia. If the animal survives, it remains stunted and sickly, and may have a short, hard cough.

This worm is, fortunately in a way, harmful only to animals under about four or five months old, and in these young animals the effects of an infestation may be very prominent just after weaning.

The worms are easily removed with old of chenopodium. Details of treatment with this drug may be had on application to the Animal Health Station, Yeerongpilly.

Treatment, however, should not be regarded as the only measure to be adopted for the control of this worm. Prevention of infestation is far more important, and this can only be ensured by strict attention to sanitation and other measures aimed at preventing the young pig picking up the worm eggs which are passed out in the dung. The regular removal of all manure, the maintenance of a high standard of sanitation in the sties and yards, and a paddock system of rearing, go a long way to keep the infestation below the point at which it becomes harmful. Furthermore, the fact that pigs on a good balanced ration can fight more effectively against the evil effects of the worms than animals which are regarded as merely farm scavengers, should not be overlooked.

MATURITY IN PIGS.

The question as to the difference between early and late maturing pigs—and, incidentally, whether early maturity means fast growth—often arises.

The following extract from the pamphlet "The Overfat Pig," issued by the Australian Meat Board will help to explain:—

> "During their growth from weaner stage to maturity, pigs pass through three more or less distinct phases. In the first, their bony framework is growing very rapidly. Then there is the phase when the muscular system (lean meat) is being rapidly developed around the bones. The third stage is when fat is deposited rapidly on and between the muscles, and the pig becomes thick and plump in conformation.
>
> "When it is remembered that a high percentage of lean meat is desired in pig carcases, it will be apparent that the pigs should be slaughtered just as they commence on the rapid fattening stage. The required degree of finish is not reached at the same weight by all pigs, some reaching it at porker weights and some at baconer weights—this difference usually being referred to as difference of type, which is inherited, but is also influenced by environment, including feeding and management."

The early maturing type of pig then is that which reaches the rapid fattening stage at an early age, say 4 to 5 months. The late maturing type takes longer to reach the same stage, being ready for market, under the same conditions, at from 6½ to 7½ months of age.

Most farmers know that pigs suitable for pork are ready for market at a much earlier age than those suitable for bacon; that is to say, the porker type pig is an early maturer and the baconer type matures late.

It should also be noted that early maturing pigs in general grow more slowly than late maturing pigs. This does not mean that the slower growers require more feed per lb. of carcase gain. Provided they are kept steadily moving along, there will be no noticeable difference in the average food requirements per lb. of carcase produced.

PIG-FEEDING.

Grain enters largely into successful pig-raising. Vine fruits and tubers are also used extensively. The phenomenal rise in the price of maize makes feeding problems difficult for the pig farmer. On the mixed farm, every effort should be made to conserve the carbohydrate-rich crops—Swede turnips, arrowroot, pumpkins, &c.—for the pigs. Molasses can be substituted for half the maize in a ration, but great care must be exercised in getting the pigs accustomed to this quantity. It should be done gradually.

Open grazing should be practised as extensively as possible; and, when porkers show a lean, unthrifty appearance, it will probably pay to carry them on to bacon weight. The farmer with a good stock of feed should be wary of buying more weaners than he can feed. If the separated milk supply is not sufficient, producers are strongly advised to use the meat meal now on the market. It is an excellent substitute.

While curdled separated milk has a slightly higher feeding value than fresh milk in pig-feeding, the use of the former is not recommended as a general practice.

The usual method of souring milk on the farm is by holding it for a period in a vat or drum which usually has an inside lining of decaying milk. This decomposing milk may contain not only the bacteria which cause normal souring of the milk, but also bacteria which are capable of decomposing the milk and turning it into a condition which is harmful to the pig. Further, when souring is practised under uncontrolled conditions, the feeding value of the milk may be greatly reduced by excessive souring.

Considering the very slight advantage of good soured milk over good fresh milk and the grave risk of an injurious decomposition of the milk when it is soured under the usual farm conditions, it is better to feed the milk fresh from the separator after the froth has been removed.

Milk should not be allowed to remain in the trough after pigs have had their meal. Any milk held over between one separating and the next should be kept in clean drums or cans, which are washed and scalded daily.

The sudden changing from sour milk to sweet milk, or from sweet milk to sour milk, in a pig's diet may readily cause digestive disorder.

COMFORTS FOR PIGS.

Adequate shade for pigs should be provided. The ordinary sty, particularly if it has an iron roof, is very hot, and some other shade is necessary in the heat of the day. If there are no trees nearby, a wooden shed will do.

Another important aid to the health and comfort of pigs is a bath in which they can lie in hot weather. To wallow in the mud is the pig's natural method of cooling itself. Unfortunately, the wallow sometimes seen on the pig farm is a filthy puddle-hole. If there is infection of any kind in the yard, it is to be found in just such a place. Dirty wallows should be drained and filled in, and a concrete or similar bath provided. This can be kept clean, and the risk of infection diminished.

Comfortable and hygienic conditions are most important in maintaining the health and well-being of pigs.

CORN COBS IN THE PIG PEN.

A good use for the corn cobs (cores) that accumulate on most farms, and around piggeries, is to make charcoal of them. The cores are of little value as a food for pigs because of their coarse, dry fibre content, and even if the whole cob (grain and core) were ground, it is doubtful whether it would be worth the trouble.

After the pigs have chewed all the corn from the cob, the waste cores and husks may be raked together into a pile and burned. When the heap is a mass of red hot coals, water may be poured over the pile. The partially charred cores, when cold, may be gathered for the pigs. Bones should also be gathered and burned, and added to the charcoal made from the cores. This cleaning up serves a double purpose; it gets rid of matter that would otherwise accumulate and become a nuisance, and provides charcoal and mineral matter for the pigs.

CARE OF LARGE WHITE PIGS.

Recent inspection of a number of Large White pigs bred on the Downs under normal and abnormal weather conditions indicates that, provided they are given proper care and attention, there need be no fear of any trouble arising, especially if care is taken, in the first instance, to select carefully from strains or families acclimatised to Queensland conditions and carrying a liberal coat of long silky hair on a fine white skin free from wrinkles.

When oil is applied to the skin for treatment of lice, it should be done in the late afternoon, or, preferably, during a cool spell in the weather.

The provision of abundant shade and protection from the weather should be regarded as a commercial proposition and will pay well on the cost involved.

If a concrete hog wallow can be provided in which the animals can "cool off" during hot weather so much the better, provided there is abundant shade, but it is preferable not to allow the pigs to wallow in a mud bath during extremes of heat. Regular treatment for lice or worms, is regarded as necessary with all pigs, and, while very young, the animals should gradually become accustomed to open air conditions in a paddock in which they can graze.

If animals are penned during the finishing stages of conditioning for market, they should be allowed out in the sun for some time daily.

CORN AND COB MEAL IN PIG FEEDING.

The grinding of the core of maize cobs and its inclusion with ground corn is like adding sawdust to porridge, for the corn is composed almost entirely of fibrous matter which is largely indigestible. The pig's digestive tract can at best but poorly utilise hard fibrous materials, such as the maize core and husks, even when they are finely ground. The fact that they do not attempt to eat these materials naturally is proof that instinct warns them of the severe digestive disorder that will surely follow. Even for brood sows, for which a bulky ration is desirable, it is much preferable to supply the bulk by feeding green lucerne or hay; or, if self-feeders are being used, good quality leafy lucerne chaff in proportion of 10 to 12 per cent. or more. The latter is rich in protein and minerals and is appetising once the pigs become accustomed to it. At the start it may be moistened.

The only time corn and cob meals would be of use is during long periods of dry weather when there is no green food available and concentrates are being fed. These periods of shortage can be provided against with hay, chaff and, in some cases, silage. In most of the pig-raising districts any lengthy period of green food shortage should obviously be overcome by practising some form of fodder conservation.

THE BREEDING SOW.

Some farmers when disposing of light weight breeding sows have been disappointed because they do not receive baconer prices for them. It should be understood that sows which have had a litter, even though they may be of bacon weights, are not suitable for manufacture into bacon. Their only use is as small goods. Perhaps, the most remarkable thing is that there should ever be sows available for sale at such weights. Obviously they are very small and stunted, and farmers who habitually breed from undersized stock cannot expect to make profits. Such sows have neither the constitution nor the conformation required for the production and sustenance of a large, thrifty litter, besides being more susceptible to disease. As pigs, to-day, are usually marketed before they attain their maximum size, the breeding stock used should be considerably larger than the progeny it is hoped to produce for market. Thus owners who have such undersized sows in their breeding herd, as referred to, cannot reasonably expect to produce good quality bacon pigs from their progeny.

FEEDING VALUE OF SKIM MILK.

Skim milk and butter milk—they should not be mixed with wash water—are of equal feeding value. These products supply all the proteins necessary to balance the carbohydrate content of the grain portion of the pig's ration. Together with lucerne, rape, barley, or other green feed—which may be either grazed or fed in the pig pen—they form an excellent ration.

Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
W. T. Burden, 44 Drayton road, Toowoomba	Harristown ..	White Leghorns, Australorps, and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca.. ..	White Leghorns and Australorps
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, Rhode Island Reds and Whites
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington ..	Australorps and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, Junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
A. E. Mengel, 181 Campbell street West Toowoomba	Glenmore ..	White Leghorns, Black Leghorns, Brown Leghorns, Anconas, Australorps and Rhode Island Reds
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Coopers Plains	Norups	White Leghorns and Australorps
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Witty, Boundary road, Kuraby	Witty's ..	White Leghorns and Anconas
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

POULTRY FARM ECONOMY.

Every effort should be made to keep production costs down to a minimum. On many poultry farms this is being done, but on many more feeding costs are too high.

The actual costs of foodstuffs is governed by supply and demand; therefore no material saving can be made at this point. Any change in the present ration fed is of doubtful value, because such a change may result in lowering the egg yield. Again, it is doubtful whether any substitute for the existing rations would be economical. This only leaves the actual practice or management of feeding open to question.

Summed up, the cost of production is governed to a great extent by the food consumed and the wastage. Any reduction in food consumption is followed by a reduction in egg production, therefore feeding costs cannot be reduced by feeding less food.

Food wastage is an appreciable factor in feeding costs. This applies irrespective of the actual cost of foodstuffs, and is applicable to dry mash, wet mash, and grain feeding. By far the greatest wastage occurs with the dry-mash system of feeding. This fact has been pointed out to many farmers who have immediately remedied the fault.

Faults in the construction of hoppers are the cause of nearly all the wastage that occurs with the dry-mash system. There are many different designs of dry mash hoppers, and a plan of a suitable hopper may be obtained on application to the Department of Agriculture and Stock, William street, Brisbane. This hopper embodies other important features, in addition to that of minimising wastage. The most important thing about any feed hopper is the feeding trough, which should permit ample space for the birds to eat, at the same time preventing any of the mash being wasted.

The hopper referred to embraces these features within certain limits. It also permits the mash to fall freely. It must be understood, however, that some mashes will run or feed more freely than others. Therefore, no one hopper will prevent different grades of mash overfilling the trough and allowing the mash to be readily scratched out. The hopper recommended has a lath along the front of the trough, and in the event of the mash running too freely and permitting wastage this lath can be shifted to reduce the space. This hopper is easily and cheaply constructed.

Recently a poultry farmer installed several of this type of hopper, and although production was maintained at the same level, the hoppers brought about a saving in food costs of approximately £4 a week. Some time ago another farmer installed similar hoppers and reduced feeding costs from five bags to three bags of laying mash each week. These two illustrations should be sufficient to demonstrate that wastage can be prevented. In the latter instance, the farmer was confident that no wastage existed on his farm.

To ascertain if wastage is occurring, a rough estimate may be obtained by looking up the purchases of foodstuffs for the previous month or a longer period. As the birds consume approximately equal quantities of mash and grain, the quantities (by weight) purchased should be approximately the same. In the event of the quantity of ingredients for a mash exceeding the quantity of grain purchased, it indicates that the excess quantity is being wasted.

A more accurate method is to count the number of birds in one shed, then empty the hopper, refill it and record the weight of mash supplied; the period which the mash lasts will indicate the true position, as each bird will consume on an average 2 oz. of mash daily. For example, 100 birds supplied with 100 lb. of mash will consume it in eight days; if it only lasted six days each bird would be wasting 4 oz. weekly; if it lasted seven days there would be a wastage of 2 oz. per bird weekly. Such a small wastage as outlined, of 2 oz. per bird weekly, does not appear to be of great importance, but with a flock of 1,000 birds this would amount to 6,500 lb. in a year and would cost about £35, based on present feeding costs.

Present high costs of all poultry foodstuffs make it essential for every poultry farmer to eliminate wastage. By putting into practice the advice offered wastage will be minimised and the margin of profit increased.

MOULD IN EGGS.

Under humid conditions, eggs are more prone to decomposition than at cooler periods of the year. This is not because of the effect of the climate on the egg itself, but because of the rapidity with which mould growths develop during warm weather. If it were practicable to prevent the egg coming in contact with moulds, decomposition of the egg from this cause would not occur.

If fowl yards are allowed to become littered with straw, dry grass, and similar material, mould spores will develop abundantly. Consequently, the poultry farmer is advised to clear away all rubbish and do all that he can to prevent the development of moulds.

Dampness in any degree is conducive to the rapid growth of moulds, consequently every precaution should be taken to ensure that the nesting material is dry and clean, and that the eggs and fillers used for packing them are dry.

Two recent examples of how easily the quality of eggs may be depreciated are cited:—In one case it was found necessary, because of a muddy poultry run, to wash every egg. The washing was well done, stains were removed with an odourless sandsoap, and the eggs were clean when packed; but unfortunately they were packed in strawboard fillers with a slight bead of moisture on the shell. In the course of two days, when these eggs had reached the market, quite a number of rots had developed. As the poultry farmer concerned had a reputation for marketing good eggs, the agent retained the eggs that were apparently good on arrival for a further two days, but, on testing, many more rots were found.

The second case was that of a farmer who had well-grassed runs for his fowls. Although nests were provided, many of the hens nested in the grass. Complaints as to the quality of the eggs were received by the agent to whom these eggs had been consigned, with the result that the next consignment to reach the floors was carefully candled. Candling disclosed a number of rots. Eggs which were in apparently good condition were retained on the floors for another two days and again candled, when more rots were revealed. This led to an investigation by the Department of Agriculture and Stock, when it was found that only the eggs that had been laid in the grass were affected, and that the rottenness was caused by mould growths which had gained access through the pores of the shell. Providing the hens with more clean nests and so discouraging them from laying in the grass corrected the trouble.

These examples indicate how easily the quality of eggs can be affected, and that it is essential—particularly during hot, humid weather—to protect eggs from decompositions caused by moulds.

CHANGES OF ADDRESS.

Subscribers are asked to kindly notify changes of address to this Department without delay.

Agricultural Notes

Poisoning "Weed Trees" and Undergrowth.

THE advantages of arsenic pentoxide as a plant poison, as an alternative to sodium arsenite, which was formerly used, have received full recognition in recent years. With sodium arsenite, the preparation of the solution involved the mixing of either washing soda or caustic soda with the white arsenious oxide to convert it into an active plant poison agent. Arsenic pentoxide, on the other hand, is soluble in cold water, and no time or labour is wasted in its preparation. For the eradication of practically all species of undergrowth and green timber it is both cheap and effective.

As arsenic pentoxide has a corrosive action on iron and tin containers, either wooden, copper, or lead-coated vessels must be used. The day's mixture should be prepared overnight in order to allow it to dissolve fully. The liquid, which should be practically colourless, must be stirred before using. If it is to be used as a spray, half a pint of molasses should be added as a sticker, or spreader, per gallon of poison. The most effective mixture is 2 lb. of arsenic pentoxide per gallon of water. For spraying tender foliage or suckers, ½ lb. per gallon is sufficient.

Two operators are necessary in dealing with undergrowth, one using a brush hook and the other following closely with the swab or spray, according to the area to be treated. The cuts should be made as near to the ground level as possible. Small areas up to several acres can be most economically treated by swabbing. Large areas require a quicker method, and for this purpose a lead-coated knapsack spray pump is recommended. The spray pump requires to be equipped with a nozzle designed to throw a fine cone of spray, and the inclusion of an auto-pop shut-off valve permits the operator to control the flow of spray by thumb pressure.

Another method is to cut the undergrowth and, after allowing it time to dry, burn it. A new growth will soon appear, but before these shoots attain a length of twelve inches they should be sprayed with the weaker mixture. The shoots are easily killed, and enough poison is absorbed to kill the roots and stump.

Tall timber can be effectively poisoned by frilling—a process somewhat similar to ringbarking. The only difference is that the cuts are downwards deep into the wood, and the bark is not removed. The mixture (2 lb. per gallon) is poured into the open cut. Most trees are easily killed in this way, but care must be taken with gums and ti-tree to prevent suckering. Box is most difficult to kill, and calls for special attention.

To obtain the best results, and reduce suckering to a minimum, poisoning should be performed in the late autumn or early winter when the sap flow is less vigorous. As arsenic pentoxide is a very dangerous poison, great care must be exercised in handling it, and precautions must be taken to prevent stock having access to it.

Arsenic pentoxide may be obtained from the Prickly-pear and Noxious Weeds Section, Lands Department, Brisbane, at the concession rate of 5s. per 20-lb. tin, f.o.r.

PASTURE RENOVATION.

Milk is intended by nature as food for the calf until it reaches an age when it can forage for itself. As milk has been valued from time immemorial as food for man, a process of selection has been used whereby the yield from the dairy cow has been greatly increased so that the surplus is available for human consumption.

The mineral content of milk is remarkably regular, no matter from what type of cow it is obtained or what type of pasture is being grazed. If the pasture is lacking in any essential constituents, the cow will draw on her body reserves or her own frame even, in an attempt to produce a milk of even composition. When these body reserves are being utilised the animal produces less milk rather than milk of a lower food value.

As lime and phosphoric acid together constitute about 50 per cent., and potash a further 20 per cent., of the mineral matter in milk, it is not surprising that long-continued grazing gradually reduces the fertility and carrying capacity of the pastures. This is because the mineral and other constituents removed in the milk are never returned to the soil but are utilized by man or other animals in the form of milk, cream, separated milk, buttermilk, cheese, whey, and other products.

A cow yielding 200 lb. of fat in a year removes in the milk about 7 lb. each of lime and phosphoric acid. When animals are sold for any purpose they take away with them the plant foods which have been utilized in building their own frames. Other losses would probably bring the total losses to from 10 to 15 lb. of both lime and phosphoric acid per animal per year. About the same amount of potash would also be removed by each animal. Twenty such cows would therefore remove from 200 to 300 lb. of each of these essential plant foods every year. This is equivalent to between 10 and 15 cwt. of bone dust or superphosphate, and 5 to 7 cwt. of sulphate or muriate of potash.

As most Queensland soils, particularly in the coastal districts, are deficient in essential plant foods, it follows that unless these are added to the pastures in some way, the carrying capacity of the land and the milk yield of the cows will be seriously reduced. In the case of extreme mineral deficiency the animals will resort to bone chewing and other depraved habits, and dairying will become unprofitable.

Grazing lands, therefore, require fertilizing just as do cultivated lands, and regular top dressings of appropriate fertilizers should be made. In addition, the droppings of the animals should be regularly distributed over the pastures by means of harrows. When the animals are fed on mineral rich supplements the droppings will be relatively rich in minerals, and their extra fertilizing value is, of course, used to the best advantage when the dung is properly spread.

GOOD SEEDS ENSURE CROP QUALITY.

Although nearly everyone will agree that better seeds mean better crops, it must not be overlooked that better cultivation means better seeds.

Seeds to be good must have a high germinating capacity, be true to variety name, and free from weed seeds, inert matter, and disease or insect infestation. No matter how careful the grower may be, all crops will contain some plants other than those which it is intended to produce. A cleaning machine should, therefore, be used before the seed is offered for sale. In Queensland, as in every other part of the world, the most critical buyers will be found among the merchants with efficient cleaning machinery.

A modern seed-cleaning plant can make good samples of uncleaned seeds better, but it cannot make bad samples good. With a full knowledge of their machinery possibilities, most merchants are willing to buy on a clean seed basis. They are not, however, inclined to purchase poor samples, and the usual market for seeds of indifferent quality is with dealers who have little appreciation of impurities. The actual seed user who insists on buying his supply on a price rather than on a quality basis encourages the vendors of goods of inferior quality. Unfortunately, seeds of indifferent quality usually carry a large profit to the seller.

Good seeds cost money to produce and money to clean, and the general improvement of farm seeds rests largely with the farmers themselves. When practically every farmer insists on a high-grade product the demand for poor-quality seeds will cease. Only the best-quality seeds are worth buying.

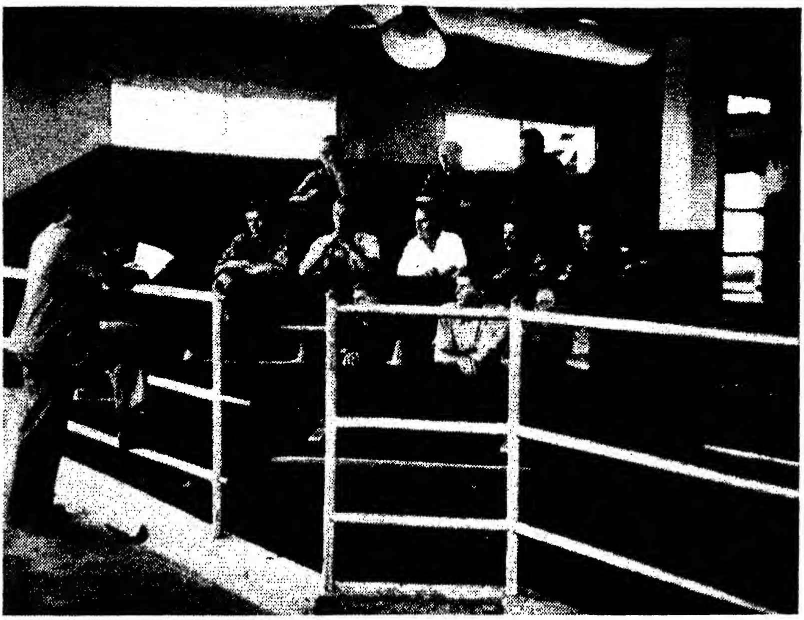


Plate 83.
ATTENTIVE LISTENERS AT THE 1941 SUGAR SCHOOL AT THE QUEENSLAND AGRICULTURAL COLLEGE.—The subject was rubber tyres for tractors.

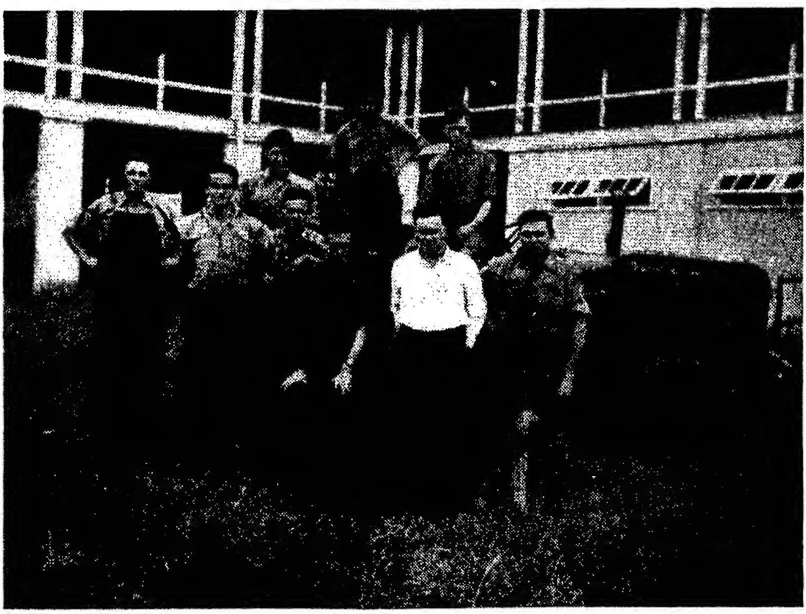


Plate 84.
A TRACTOR GROUP AT THIS YEAR'S SUGAR SCHOOL AT GATTON.—The "taking down" and re-assembling of a power unit was a job well done.

THE CASE FOR CONCRETE.

Concrete is invaluable on the farm for making silos, troughs, fence posts, and for other jobs. First costs are the only costs and, as a rule, there are no maintenance charges required for the upkeep of a concrete structure. In fact, concrete improves with age, growing stronger over a long period of years; once having attained its maximum strength it maintains it indefinitely. It is very obvious that there will be a considerable saving in time and money where durability is a major factor in structures which are subjected to severe wear and tear.

As concrete, more than any other building material, may be moulded into any shape and adapted to almost any kind of construction, it is particularly suitable for an infinite variety of uses in and around the farm and station.

Provided the user of cement and concrete adheres closely to ordinary methods governing the mixing, placing, and maturing of good concrete, no special knowledge is required.

A study of the losses occurring in the agricultural and pastoral industries of this and other countries as a result of fire emphasises the need for fireproof construction in farm and station buildings.

Where fences and buildings have been constructed of materials which will not burn or assist the flames to spread, fire risks are reduced to a minimum. Concrete is essentially a fireproof material and, where possible, should be used in the construction of buildings in which incubators requiring heating apparatus will be housed or in which inflammable products will be stored. In addition, this material builds up property values because of the improved appearance and increased usefulness of the farm structures.

With the increased demand for ordinary fencing posts brought about through the subdivision of large holdings for closer settlement, there is frequently insufficient timber to meet necessary replacements. Concrete is an excellent substitute and will certainly be used more extensively for this purpose in the future. Concrete posts are maintenance-free. They do not rot or burn and are not injured by insects or fungous growth. Good fencing is essential. Constant attention, time, and money are required to keep wooden fence posts in serviceable condition, and this expenditure may be largely avoided by using concrete fencing posts.

Detailed instructions for making silos, troughs, tanks, wells, roofing tiles, fence posts, &c., can be obtained from cement manufacturers.

SEEDS OF NATIVE GRASSES.

Within recent years intenser interest has been shown, both by pastoralists and by dairymen, in the sowing-down of pastures of drought-resistant native grasses. Many graziers who have sought information about the availability of native grass seeds desire seed for the artificial reseeding of natural pastures which have been thinned out by drought. Numerous other sheep and cattle raisers are eager to sow-down on their own properties drought-resistant native grasses from other parts of the State. Many dairy farmers also desire to test out the best of the native pasture grasses under local conditions.

Grasses most in demand by pastoralists are the Mitchell grasses. There are four distinct types of Mitchell grasses—Curly Mitchell, Hoop Mitchell, Barley Mitchell, and Blue Mitchell—and of these, perhaps, the best one for general purposes is the Curly Mitchell.

Seed of Curly Mitchell is now being collected in large quantities for commercial purposes. If sown broadcast about 4 lb. an acre should suffice to give a good stand; and this quantity may be reduced by half if the seed is sown in drills with a combine.

In some circumstances, one or more of the other three types of Mitchell grasses are to be preferred to the Curly Mitchell, but, so far as can be ascertained, no seeds of these types are yet available.

While the purchaser of Mitchell grass seed has at present little choice in the matter of the origin of the seed (practically all of the seed being harvested in northern New South Wales), he should bear in mind that seed collected in his own district, or in a district with similar climatic conditions, is likely to be better for local sowing than seed from other sources.

Seed of Australian blue grass has been on the market for many years. This, also, is harvested in New South Wales, and, consequently, may not be as valuable as locally-collected seed for sowing in Queensland.

Plate 85.
"GAS FROM GUM TREES"—A college tractor fitted with a gas producer by the tractor group at this year's Sugar School at Gatton.

Plate 86.
THE SAME GROUP AT WORK ON A DIESEL TRACTOR.

FARM GATES.

On practically every holding there is a lot of work to be done during slack periods, such as fencing repairs, the making and hanging of gates, the painting of buildings, and the overhauling of machinery, implements, and harness. Some of these jobs can be done during dry weather, and others are better reserved for rainy periods.

It is advisable to give attention to the outside jobs first and, of these, the erection and repair of gates is important. It is indeed, surprising to find so many make-shift gates on the farm when strong, light gates can be made or purchased at very reasonable prices.

Of the different types on the market the wooden gates are the best, as those having a steel pipe frame, if once bent out of shape, are difficult to straighten, whereas a broken rail or two can readily be replaced. The self-opening types are favoured by some farmers, but these are more expensive and more liable to get out of order than the simpler kind.

Gates should always be swung independent of the fence on good heavy posts placed 4 feet in the ground with a sill log in between. The hinges, which should be strong, are generally placed in a vertical line. Occasionally, it is desirable that the foot of a gate should lift when opened, and this can be arranged by placing the lower hinge half an inch off the plumb in the opening direction.

The following materials are required to make a double, five-barred bolted gate for a 12-foot opening without any morticing:—

112 running feet of 3-inch by 1-inch or 4-inch by 1-inch timber;

3 lb. of 3½-inch by ⅜-inch bolts and washers;

2 pairs hook and eye hinges 2 feet by 2 inch by 5/16 inch.

Butts and heads should be cut 4 feet long and should be double—that is, placed on each side of the bars. The bottom of the first rail should be 3 inches from the bottom of the upright. The distance between the first and second rails should be 6 inches; between second and third, 6 inches; between third and fourth, 7 inches; and between fourth and fifth, 8 inches. There should be two double stays on either side of rails on each gate running from the bottom of the butt to the top of the head.

When hinges are being placed in position, small pieces of 3-inch by 1-inch timber should be inserted against the rails for packing purposes. A sliding piece of 3-inch by 1-inch timber along the third rail between the stay and the head makes an excellent fastener.

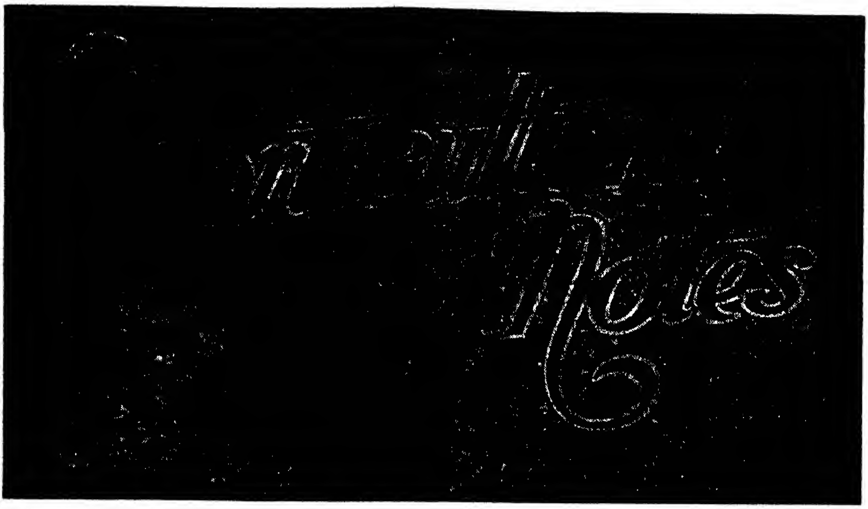
Gates are not completed until they have been painted, and, if the first two coats are given before the gates are put together, a considerable amount of time will be saved.

SUDAN GRASS IN THE SOUTH-WEST.

Sudan grass is outstanding as a hay and grazing crop for the drier farming areas, as is indicated by its popularity on the Darling Downs and in the Maranoa district. Lack of harvesting machinery and implements, such as the reaper and binder, or mower and rake, on many stock farms is often the retarding factor so far as the conservation of hay is concerned.

With the more extensive use of blue panic and Rhodes grass, the conservation of Sudan grass as hay and silage, and the more widespread utilisation of winter fodders, such as wheat and barley, it should be possible to carry on dairying in the drier country away from the coast right through the winter, even in the Maranoa. At present, many dairy farmers in those regions dry the cows off during the autumn and may not milk again until the spring.

In recommending Sudan grass as a grazing crop the risk of fatalities as a result of hydrocyanic acid-poisoning must be kept in mind. By taking reasonable precautions in feeding, many farmers have utilised Sudan grass in all stages of growth as a grazing crop without ill-effects. An effort should be made to procure pure seed, free from admixture with sorghum or Johnson grass hybrids. Full information regarding the cultivation of Sudan grass can be obtained from the Department of Agriculture. and Stock, Brisbane.



Avocado Culture.

THE avocado seems to be adapted to a variety of soils, the chief requisite being perfect draining—stagnant water at the roots is fatal. The heavier soils seem to be more favourable to the growth of the tree than light sandy loams, but where possible moist medium loams should be selected for the crop.

The climatic conditions of the north and south coastal foot-hill districts of Southern Queensland are generally considered saisfactory for avocado culture. Up to the present, it has not been the general custom to irrigate avocado trees. However, a wet spring is usually followed by a good crop and a dry spring by a poor crop. During the present season only those orchards in which watering was practised have yielded good crops. The question of supplying water to the trees during dry springs should therefore receive consideration.

Avocado trees will only thrive in frost-free, well sheltered, warm situations. In districts where the prevailing winds are such as to interfere with the normal growth, belts of standing scrub should be retained as a protection to the orchard. As an alternative, artificial wind-breaks may be required. The site should be an area of unbroken land, nearly level or with a gentle slope. Steep hillsides should be avoided on account of the danger of sustaining irreparable losses by soil erosion.

The preparation of the land should be thorough. All stumps and roots should be removed to a depth sufficient to ensure that they do not impede cultivation. The land should then be skim-ploughed and then cross ploughed and harrowed. Rubbish and roots can thus be collected and burnt. When the weeds are eliminated, the land should be cultivated as deeply as possible, and the soil worked down to a fine tilth. Where practicable sub-soiling is desirable as it facilitates root development.

In Queensland, it is usual to plant on the square system, though on hillsides a form of contour planting is preferable. The trees are spaced 25 feet apart, which permits of 70 being planted to the acre. The young trees should be planted so that the point of union between the bud and the seedling stock is slightly above the soil level.

A liberal watering is necessary after planting. The ground around the young trees should be kept liberally mulched with any coarse material which is not liable to pack and form a layer impervious to air and water. Spring planting is customary, though trees planted towards the end of the wet season (February to March) after the hottest period of the year, have done equally well.

Numerous varieties have been introduced into Queensland, but many have been discarded for various reasons. Trial plots have recently been planted, and those varieties which promise to be suitable are being worked up and kept under observation. Although at present no definite recommendations can be made, intending planters should confine their selection to varieties such as Blakeman, Grande, Goodwood, Queen, Spinke, and Wilsonia, which, from the data at present available, appear suitable for coastal foothill plantings in Southern Queensland.

THE QUEENSLAND NUT.

Where it is proposed to plant an area of the Queensland Nut on open or forest ground, the land should be prepared in plenty of time. Thorough deep ploughing of the area will be necessary to give the young trees a sufficient depth of a free soil in which to make a good root system. Subsoiling, if practicable, is also desirable.

When planting the young trees, a good hole, at least two feet across and eighteen inches in depth, should be dug so that the tap root—which is comparatively long—can be properly set vertically into the ground, and the secondary roots distributed evenly around the plant.

In digging the trees from a seed bed, care must be taken to remove them as carefully as possible, and to get a good length of the tap root with the plant. If the tap root is injured during digging, care should be taken to cleanly prune off the injured portion above the point of mutilation. If the tap root is too long, it can be pruned back.

It is advisable to soak the bed thoroughly the day before lifting the young trees, as this will make it easier to extract them from the ground without breaking the roots. Loosening the soil, by making a trench alongside the rows, will simplify digging.

The trees should be planted in the ground at the same level as they were in the nursery bed, or perhaps a little deeper. Excessively deep planting should, however, be avoided.

The young trees should be well watered at the time of planting, and also subsequently, should the weather be dry.

On open land, shade should be provided by driving sufficient stakes into the ground around them to support a good hessian or bag cover.

Very often the main stem of the tree is allowed to grow too high before the top is pruned off. This will result in an ungainly, lanky tree. With the Queensland Nut, as with fruit trees, pruning should aim at producing a sturdy-set tree, well-balanced and fairly open.

The young trees should not be allowed to grow beyond two feet in height on a single stem before the top is pruned off. Three side-shoots nicely placed are later trained to make the framework of the tree.

Many young trees do not come away well on a single stem, this failure being due to a variety of causes, and a cluster of base shoots may arise as a consequence. It will then become necessary to select the strongest and best-situated shoot to form the tree, the others being cleanly cut away.

No matter whether the trees be planted amongst bananas, pineapples, or other fruits, or in the open, a good stake should be driven alongside each tree, both to protect and support it. Many young trees are destroyed or permanently misshapen by injuries caused during cultural operations, and some protection is clearly necessary.

Where young trees have grown very densely through too many low shoots having been permitted to grow, a certain amount of thinning out of surplus main branches, or of the secondary growths, will be necessary to open up the trees to light and air.

SELECTION OF BANANA SUCKERS.

In planting a new area of bananas it is advisable to make a good selection of suckers. In every banana plantation there are stools which are above the average, and it is from these that growers should select material for future plantings. Some stools are outstanding in growth and quality production. For example, they may have remained free, or nearly so, from borer attack, or they may have benefited from better soil, greater amount of moisture and other conditions in their immediate vicinity.

It is advisable for growers to mark these outstanding stools for use at planting time, noting the quality of the fruit which has been recently cut from them or which they are still bearing. This can be done by placing a stake against the selected stools or some other suitable means of easy identification at the time when planting material is required.

If by selection it is possible to produce a more open bunch of the Cavendish variety, it will be of benefit in so far that the harbourage for skin blomishing insects is lessened, that the bracts are permitted to fall more freely from the bunch, and that individual fingers fruits are more exposed to sunlight—thus ensuring uniform development of the bunch.

PACKING SHEDS AND EQUIPMENT.

Some fruitgrowers carry on, season after season, with makeshift equipment, when, for a little time and a small expenditure of money, a properly-equipped packing shed could be provided.

Packing stands, nailing-down presses and benches, sizing-machines, hammers, stencils, &c., should all be gone over and restored to a high state of efficiency. Simple designs for packing stands, nailing-down presses, and case-making benches can be procured, and are not hard to follow by anyone who is useful with a hammer and saw. Simple forms of sizing machines can also be made at home, while those growers who have commercial machines should overhaul them thoroughly, tightening up all screws, bearings, &c., and, if necessary, renewing the padding in the bins and feed channels. Broken parts should be replaced and power plants overhauled. Broken handles in working tools should be renewed. Case-end scrapers, packing needles, &c., should be sharpened and greased and packed away until required next season.

Complete sets of new stencils can be cut. A sheet of thin zinc, a small chisel, round and flat fine-grain files, a hammer, and a piece of end-grain hardwood are the necessary tools. The designs of the letters to be cut can easily be made by obtaining stencils, and copying them on to the zinc in the design wanted. The stencilled letters are then cut out of the sheet of zinc with hammer and chisel, and, in that way, an excellent stencil is made. Stencils are easily obtained, and there is no need to use blue crayon for marking cases.

When the overhauling of plant has been completed, growers should turn their attention to the cleanliness of the packing shed. Old cases and picking-boxes should be repaired or burned, a close inspection of the cracks and crevices being made for pupating insects, such as codling moths. Any shed-stored fruit, which has rotted in the cases, should be removed and destroyed and the cases thoroughly sterilized by completely immersing them in a 5 per cent. solution of formalin for at least one minute. Floors and other parts of the building affected by juice from rotted fruit should also be treated.

Close attention to these details will enable growers to make a clear start at the following harvesting period.

WINTER WORK IN THE ORCHARD.

Now that the weather is becoming cooler, it would be well to give some thought to a work programme for the winter. Among the jobs suggested are:—

Clean up all orchards and vineyards, destroy all weeds and rubbish around the trees likely to harbour pests of any kind, and keep the surface of the soil well stirred, so as to give the birds and predaceous insects every chance to destroy any fruit-fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Pruning can be started on fruit trees which have shed their leaves towards the end of the month, as it is a good plan to get this through as early in the season as possible instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines. (The later vines are pruned in the season the better in the Granite Belt district, as the late-pruned vines stand a better chance of escaping injury by late spring frosts.) All worthless, badly-diseased, or wornout trees that are no longer profitable, and which are not worth working over, should be taken out and burnt, as they are both valueless and a harbour for pests.

Land intended for new orchards should be got ready. The preparation of the land should be thorough. All stumps and roots should be removed to a depth sufficient to ensure their not impeding cultivation by coming in contact with implements. The preliminary cultivation should consist of a light ploughing to a depth sufficient to turn the weeds or grasses so that their roots are exposed, followed by cross ploughing and harrowing, whereby light roots, &c., are collected and removed. When perennial weeds, of which couch grass is a fair sample, are eliminated, the land should be ploughed and cross ploughed as deeply as possible, and the soil reduced to a fine tilth. Where subsoiling can be practised it is a decided advantage in admitting root penetration and conservation of moisture.

LADY FINGER BANANAS.

The fruit of the Lady Finger variety of banana has a very pleasant flavour, its keeping qualities are good, and it is always in demand.

Alluvial flats with a subsoil of free clay suit the variety best, but it can be grown successfully on hillsides of even contour where the rainfall is copious and regular, and where shelter is provided from heavy winds.

Thorough preparation of the soil is necessary, and, where possible, it should be worked to a depth of at least 12 inches. Healthy butts, at least nine months old, with a minimum diameter of 6 inches, are the best planting material. On the loamy flats, the distance apart should be 18 feet by 16 feet, with three followers; on hillsides and other less favoured sites, 15 feet by 15 feet, with two followers.

To prepare for planting with two followers, the butt should have about 2 feet of the pseudo stem left and all visible eyes or buds gouged out with the exception of two which should be on opposite sides. The same method is adopted for three followers, except that three buds are left spaced equally round the butt.

Two, or, as the case may be, three suckers will appear in a short time after planting and trees are allowed to grow, but all other growth must, for at least nine months, be removed as soon as convenient after it appears above the soil. After the selected suckers have made two-thirds of their growth towards maturity, giving them a height of approximately 8 feet, a follower can, under favourable conditions, be selected on each plant in a straight line away from the parent plant and left to form the fruiting material for the second crop. The growth habit by which successive suckers may be selected in a straight line away from the original plant will persist for the life of the plantation, and all other growths should be removed as soon as possible. By careful attention to this and other cultural methods, maximum returns can be expected and realised.

Periodical applications of fertilizer, when the soil is of average fertility, will have beneficial results.

Cultivation should be shallow to avoid destroying the root system.

The planting of Mauritius beans down the centre of each row at a distance of 30 inches between plants would ensure a good mulch during hot summer weather and considerably retard weed growth.

Covering of the fruit with a suitable material, as advocated for Cavendish and Mons Marie varieties, during their maturing periods amply repays the grower.

THE VALUE OF HUMUS IN THE CITRUS ORCHARD.

Humus is an organic compound formed by the decay of vegetable matter in the soil, and is of great value in the citrus orchard.

Comparatively small amounts of humus are present in hot, dry localities on account of the higher temperatures. In such areas, the humus is burnt out of the soil rapidly and does not accumulate to the same extent as it does in a moist or cool climate. Humus possesses the power of retaining moisture in the soil, whilst other advantages are that it makes heavy soils more porous, and sandy soils more cohesive.

It is possible to maintain a high humus content in the soil by annually working in vegetable matter—such as stable manure, green cover crops, leaves, and weeds—for these, if used, supply decaying vegetable matter to the soil.

When the humus content is low, sandy soils lose water quickly, and heavy soils become hard and baked after heavy rains. Under such conditions, trees make poor growth, and the tops of the trees become thin. Small fruit may be formed, and it is subject to sunburn and splitting.

It is, unfortunately, difficult to obtain anything like adequate supplies of stable manure or similar material of a humus-forming nature, and, in order to make up the deficiency, the growing of green manure crops between the trees at times to correspond with the rainy season is recommended. Growing cover crops during dry periods is not desirable, because trees must not be deprived of the available soil moisture at such times. Under average conditions, green crops should be planted in citrus orchards about February and may be turned under about June.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

SUMMER fruits are now off the market, and citrus fruits of excellent quality are now in full supply. To maintain prices, growers are advised to keep up the quality and maturity of their consignments now coming forward. Once again the folly of sending immature fruit to southern markets is stressed. Only good quality fruit, for which prices satisfactory to the producer will be willingly paid, should be sent south, therefore strict observance of maturity standards is strongly advised. Cold weather in the southern cities will obviously not help in the ripening of tropical fruit, consequently it is necessary that custard apples, pineapples, papaws, avocadoes, and other fruits shall have attained the right stage of ripeness before despatch.

Prices during the last week of April were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 6s. to 11s.; Sixes, 8s. to 13s.; Sevens, 8s. to 15s.; Eights, 8s. to 15s. 6d.; Nines, 8s. to 14s. 6d.; Bunches, 1d. to 6½d. dozen.

Sydney.—Cavendish: Sixes, 10s. to 15s.; Sevens, 15s. to 18s.; Eights and Nines, 18s. to 21s.

Melbourne.—Cavendish: Sixes, 12s. to 15s.; Sevens, 14s. to 17s.; Eights and Nines, 16s. to 20s.

Brisbane.—Lady Fingers: 1d. to 7½d. dozen.

Brisbane.—Sugars: 2½d. to 4d. dozen.

Pineapples.

Brisbane.—Smoothleaf, 3s. to 7s. case; Loose, 1s. 6d. to 5s. dozen; Roughs, 3s. to 8s. case; 1s. 6d. to 6s. dozen.

Sydney.—Smoothleaf, 7s. to 12s. case.

Melbourne.—Smoothleaf, 6s. to 11s. Water Blister prevalent.

Papaws.

Brisbane.—Yarwun, 8s. to 11s. tropical case. Gunalda, 7s. to 8s. bushel. Locals, 5s. to 7s. bushel.

Sydney.—10s. to 16s. tropical case.

Melbourne.—16s. to 20s. tropical case.

Custard Apples.

Brisbane.—3s. to 4s. 6d. half bushel.

Sydney.—3s. to 6s. half bushel.

Melbourne.—6s. to 8s. half bushel.

Rosellas.

Brisbane.—1s. 6d. to 2s. 6d. bag.

Avocadoes.

Brisbane.—6s. to 8s. Specials higher

Sydney.—4s. to 12s. half bushel.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels, 7s. to 11s. bushel; Commons, 6s to 9s. bushel.

Grapefruit.

Brisbane.—5s. to 9s. bushel.

Sydney.—Gayndah, 8s. to 14s.; Others, 4s. to 8s.

Melbourne.—14s. to 18s.

Mandarins.

Brisbane.—Fewtrills, 8s. to 10s.; Emperors, 9s. to 12s. Only the choicest of fruit will sell readily on southern markets.

Lemons.

Brisbane.—7s. to 15s. bushel.

Sydney.—Gayndah, 9s. to 15s. bushel.

Melbourne.—10s. to 15s. bushel.

Passion Fruit.

Brisbane.—Firsts, 10s. to 14s. half bushel. Seconds, 6s. to 9s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Stanthorpe Granny Smith, 6s. to 7s. Others, 5s. 6d. to 8s. 6d.

Pears.

Brisbane.—Southern, 5s. to 11s. bushel.

Grapes.

Brisbane.—Stanthorpe Comiton, 9s. to 11s. Walthams, 6s. to 10s. half bushel. Others, 3s. to 6s. half bushel.

Tomatoes.

Brisbane.—Ripe, 2s. to 3s. 6d. Coloured, 2s. 6d. to 5s. Stanthorpe, green, 1s. 6d. to 2s. 6d. Local, green, 2s. to 4s.

Sydney.—4s. to 8s. half bushel.

VEGETABLES.

Beans.—Brisbane: Stanthorpe, 3s. to 5s.

Peas.—Brisbane: Stanthorpe, 6s. to 8s. bag.

Cabbages.—Brisbane: Stanthorpe, 4s. to 7s. Locals, 1s. to 5s. dozen.

Cauliflowers.—Brisbane: Stanthorpe, 10s. to 14s. chaff bag.

Carrots.—Brisbane, 4s. to 1s. 3d. bundle.

Lettuce.—Brisbane, 6d. to 2s. dozen.

Beetroot.—Brisbane, 4d. to 1s. dozen.

Marrows.—Brisbane, 1s. to 3s. dozen.

Pumpkins.—Brisbane, 3s. to 4s. bag.

Rhubarb.—Brisbane, 9d. to 2s. bundle.

Cucumbers.—Brisbane, 6d. to 1s. dozen; 3s. to 5s. bushel.

Chokos.—Brisbane, 2d. to 4d. dozen.

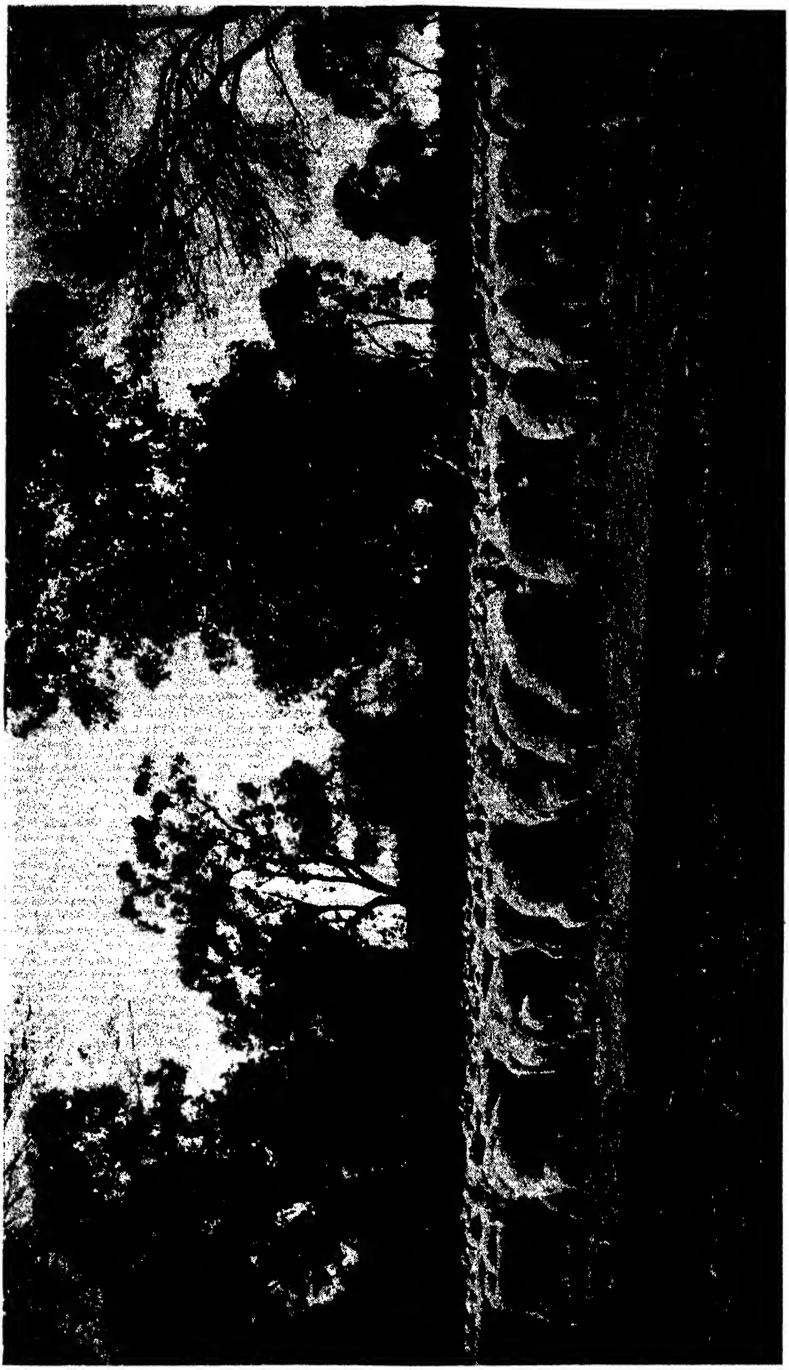


Plate 87.

WESTERN-BRED MERINO WETHERS ON BRIGALOW COUNTRY IN THE TARA DISTRICT, S.Q.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Ayrshire Cattle Society, production charts for which were compiled during the month of March, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (STANDARD, 350 LB.).				
Alfa Vale Model 2nd	W. H. Thompson, Alfa Vale, Nanango	16,792·2	813·860	Reward of Fairfield
Alfa Vale Doris	W. H. Thompson, Alfa Vale, Nanango	15,828·05	701·120	Reward of Fairfield
Faversham Pixie	R. J. Couchman, Warra	11,526·25	463·63	Greyleigh Songster
Fairlie Princess 19th	C. B. Mitchell, Fairlie, Rosenthal	8,209·69	409·491	Fairlie Minor
Trevor Hill Twinkle	Geo. Gwynne, Umbiram	11,027·44	402·378	North Glen Emblem
Pilton View Duchess	P. D. Fiechtner, Pilton View, via Greenmount	9.774·00	390·602	Navillus Venie's Sheik
Merravale Sweetheart	W. Soley, Malanda	11,533·8	373·39	Greyleigh Honorarium
SENIOR, 4 YEARS (STANDARD, 330 LB.).				
Fairlie Chrissie 12th	C. B. Mitchell, Fairlie, Rosenthal	11,000·49	459·395	Rosenthal Peggy's Admiration
Evansvale Beattie 4th	J. F. Evans, Malanda	8,918·85	354·185	Malanda of Glenore
Springlands Lady Primrose (215 days)	V. A. Wyvill, Yarralea, Upper Yarraman	8,479·75	342·545	Osiris of Greyleigh
Alfa Vale Lovely 10th	J. E. Heath, Springlea, Merlwood, Murgon	9,352·15	332·553	Reward of Fairfield
JUNIOR, 4 YEARS (STANDARD, 310 LB.).				
Cedargrove Ivy 22nd	E. Giles, Nerang	9,741·3	374·890	Cedargrove Winlad
SENIOR, 3 YEARS (STANDARD, 290 LB.).				
Alfa Vale Gem 10th	W. H. Thompson, Alfa Vale, Nanango	14,688·95	524·193	Reward of Fairfield
SENIOR, 2 YEARS (STANDARD, 250 LB.).				
Alfa Vale Pansy	W. H. Thompson, Alfa Vale, Nanango	12,965·95	568·628	Reward of Fairfield
Balcarres Primrose 9th	E. E. Reeve, Balgowan, Muldu	8,348·35	372·341	Mordern Signal

	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Blacklands Gentle Lady	W. J. Freeman, Rosewood	7,871·4	345·949	**Blacklands Security**
Pilton View Dinah	P. D. Fiechtner, Pilton View, via Greenmount	9,475·5	345·554	**Navillus Venie's Sheik**
Navillus Daphney 2nd	Con. O'Sullivan, Navillus, Ascot, Camboova	7,322·00	295·512	**Navillus Vice Regal**
Happy Valley Marie	Reg. R. Radel, Happy Valley, Coalstoun Lakes	6,630·55	294·597	**Sunny View Artist**
Oak Vale Cinderella	Con. O'Sullivan, Navillus, Ascot, via Camboova	15,188·5	282·765	**Raleigh of Chatham**
Yarralea Jewel	V. H. Wyvill, Yarralea, Upper Yarraman	6,444·00	272·198	**Trevlac Alert**
	JERSEY.			
	MATURE COW (STANDARD, 350 LB.).			
Oxford Vita	W. A. Berderow, Fairney View	7,486·00	371·312	**Oxford Rivoli**
	SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Trecarne Rosella 8th	T. Petherick, Trecarne, Lockyer	6,732·1	396·056	**Trinity Some Officer**
Mornmoot Starbright 3rd	Farm Home for Boys, Westbrook	8,057·55	377·879	**Werribee Warrior**
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Glenmore Diana	S. H. Caldwell, Walkers Creek, Bell	9,118·81	517·846	**Wheatlands Jester**
Kathleigh Sylvia	G. C. Schroder, Warra	7,807·53	462·109	**Kathleigh Royal Flyer**
Trecarne Chimes 3rd	T. A. Petherick, Trecarne, Lockyer	7,500·5	392·578	**Trinity Some Officer**
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Rosalie Dream Girl	G. V. Tilley, Beaudesert	6,133·3	338·111	**Oxford Rivoli**
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Strathdean Floss	S. H. Caldwell, Walkers Creek, Bell	5,292·82	290·972	**Langside Noble Dreamer**
Bellgarth Lorraine	D. R. Hutton, Bellgarth, Cunningham	4,987·98	286·042	**Trecarne Renown II.**
Lermont Clara Bell	J. Schull, Lermont, Oakey	4,419·85	242·160	**Woodside Golden Volunteer**
Rosemount Marie	W. A. Berderow, Fairney View	4,775·25	231·807	**Oxford Royal Remus**
	AYRSHIRE.			
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Benbecula Coral	M. J. Brownlie, Fairhill, Oakey	6,181·9	307·562	**Benbecula Brian 2nd**

In Memoriam.

ERNEST GEORGE EDWARD SCRIVEN

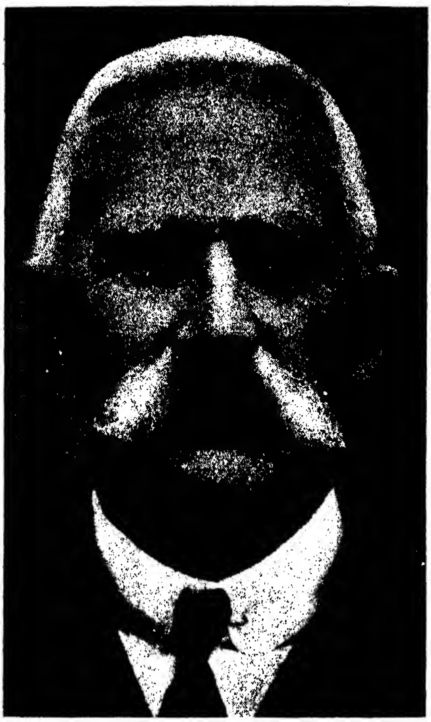


Plate 88.

Mr. E. G. E. Scriven, formerly Under Secretary of the Department of Agriculture and Stock, died in Brisbane on 14th April at the age of 84 years. The last of the old school of Under Secretaries, Mr. Scriven retired from the Department of which he had been the permanent head for twenty years in December, 1924. He was one of the most capable and beloved men in the Public Service of the State and throughout his long official career, maintained the highest traditions of public administration.

Until 1888 agricultural affairs in Queensland were administered by a sub-department of the Department of Public Lands with a staff of two, Peter McLean and Ernest Scriven. When the Department of Agriculture was separated from the Lands Department in that year, Mr. McLean was appointed Under Secretary with Mr. Scriven as his chief clerk. On Mr. McLean's appointment as Director of Agriculture in 1904, he was succeeded by the late Mr. P. J. McDermott, and when Mr. McDermott became Principal Under Secretary, Mr. Scriven succeeded him as Under Secretary and remained in that position until his retirement.

The late Mr. Scriven was born in Stratford-on-Avon, Warwickshire, England, in 1856. As a boy of fifteen he was at school in Paris in the days of the Commune in 1871, and was among those who had to take refuge in the British Embassy. Coming to Queensland as a young man in the early 'eighties, he gained "colonial experience" as a jackaroo on Eton Vale Station, near Cambooya, then owned by the late Sir Arthur Hodgson. He afterwards gained further land experience in North Queensland which was followed by a term of service with a trigonometrical survey party, in the course of which he travelled throughout the State. Returning to Brisbane, he joined the agricultural administration and became a co-founder of the Department of which he was eventually to become the chief. Ability, foresight, earnestness, energy, enterprise, and strict integrity—in which were united a charming courtesy and kindly regard for others in all his personal contacts—characterised his administration during nearly 40 years of remarkable agricultural progress and land settlement in Queensland. Mr. Scriven served under no fewer than seventeen Ministers of Agriculture and his name will ever be associated with the history of primary industrial progress in this State. During his time in the Service, every man on the land knew Mr. Scriven personally, by repute, or by correspondence, and he was a friend to them all. He is survived by two sons and two daughters to whom sympathy is extended in their bereavement.

General Notes

Staff Changes and Appointments.

Dr. Montgomery White, M.Sc. (Qld.), D. Med Sc. Biochem. (Lond.), who has been carrying out the duties of Biochemist, Department of Agriculture and Stock, has been appointed Agricultural Chemist in the Department.

Mr. S. A. Green, Inspector, *Diseases in Plants Acts*, has been transferred from Wallangarra to Warwick, and Mr. C. Schindler, Inspector, *Diseases in Plants Acts*, now stationed at Warwick, will be transferred to Wallangarra.

Mr. G. Minchin Smith, of Amalgamated Sugar Mills Ltd., Pleystowe, has been appointed millowners' representative on the Pleystowe Local Sugar Cane Prices Board in succession to Mr. W. F. Clarke.

Mr. T. W. Kite, relieving Clerk of Petty Sessions at Proserpine, has been appointed chairman of the Proserpine Local Sugar Cane Prices Board for the period Mr. H. A. Galloway, Clerk of Petty Sessions, is absent on recreation leave.

Mr. Wm. Bell, Department of Public Lands, has been appointed deputy member of the Rural Development Board during the absence on recreation leave of Mr. J. L. Callaghan, member and deputy chairman of the Board.

Mr. H. E. Perry, Miskin street, Toowong, has been appointed an honorary ranger under *The Native Plants Protection Act* and an honorary protector of fauna.

Mr. L. F. Mandelson, B.Sc., Research Officer, Agricultural Section, Division of Plant Industry (Research), Department of Agriculture and Stock, has been transferred from Inglewood to Brisbane.

Mr. C. Schindler, inspector under *The Diseases in Plants Acts*, Wallangarra, has been appointed also an inspector under *The Diseases in Stock Acts*.

Mr. J. A. Franzman, Acting Clerk of Petty Sessions, Mossman, has been appointed chairman of the Mossman Local Sugar Cane Prices Board, vice Mr. J. Gaffney, on leave.

Messrs. F. C. West (Rockhampton) and H. H. H. Hodges (Manly) have been appointed inspectors under *The Diseases in Stock Acts*, *The Slaughtering Act*, and *The Dairy Produce Acts*, Department of Agriculture and Stock.

The following transfers of inspectors under *The Diseases in Stock Acts*, *The Slaughtering Act*, and *The Dairy Produce Acts*, have been approved:—

Mr. C. Caswell, from Oxley Bacon Factory to Doboy Bacon Factory;

Mr. J. A. L. Rheuben, from Doboy Bacon Factory to Oxley Bacon Factory;

Mr. A. H. Strohfeldt, from Doboy Bacon Factory to Jandowae;

Mr. V. J. Brimblecombe, from Monto to Toowoomba; and

Mr. D. S. Robertson, from Murarrie to Monto.

Northern Pig Board Levy.

The Northern Pig Board's administrative levy regulations, which have been in force since May, 1937, have been further extended until 31st December, 1943, and shall apply to all growers delivering pigs to the Northern Pig Board. The levy is at the rate of sixpence per pig delivered to the board.

"THE DAIRY PRODUCE ACTS, 1920 TO 1939."

An examination will be held for Certificates of Proficiency in the subjects of Milk and Cream Testing and Milk and Cream Grading on Saturday, 19th July, 1941, and in the subjects of Butter Making and Cheese Making on Saturday, 26th July, 1941, in centres that will, as far as possible, be arranged to suit candidates, who should notify the undersigned not later than the 20th June.

Entrance fee 5/- for each subject should accompany the application.

Candidates must be not less than eighteen years of age on the day of the examination.

R. P. M. SHORT, Under Secretary,
Department of Agriculture and Stock,
Brisbane.

Open Season for Duck and Quail.

An Order in Council issued under "*The Fauna Protection Act of 1937,*" provides for an open season for duck and quail in Queensland.

The effect of this Order in Council is to fix the open season for duck and quail in Southern Queensland from 1st May, 1941, to the 30th September, 1941, both inclusive, and in Central and Northern Queensland from 1st July, 1941, to the 30th November, 1941, both inclusive.

The attention of shooters is drawn to an Order in Council which prescribes that twenty (20) duck and twenty-five (25) quail are the maximum numbers, respectively, which any one person may take during a period of twenty-four hours.

Size Standard for Grape Fruit.

An amendment of *The Fruit and Vegetable Grading and Packing Regulations,* which are enforced under "*The Fruit and Vegetable Acts,* 1927 *to* 1939," provides for an alteration of the minimum size standard for grape fruit from 3½ inches to 3 inches.

In Memoriam.

FREDERICK RICHARD DUNN

Plate 89.

The passing of Mr. F. R. Dunn, Metropolitan District Inspector of Stock, on 8th April, after a brief illness, is recorded with deep regret.

Born at Ipswich, Queensland, in May, 1892, the late Mr. Dunn received his early education in that city. In 1906 he gained first place in a bursary awarded by the Department of Public Instruction and tenable at the Queensland Agricultural College. On graduation from the College he engaged in farming in the South Burnett District, and afterwards obtained a high pass in an examination for appointment as a stock inspector. On the outbreak of the first world war he enlisted for active service abroad and was drafted to the 7th Army Veterinary Corps and served with the A.I.F. Mounted Division in Egypt and Palestine until the Armistice. One of his brothers, who also was in the A.I.F., was killed in action at Gallipoli.

On his return from the war, Mr. Dunn was appointed Stock Inspector at Muttaburra and as District Inspector of Stock was stationed subsequently at Cooyar, Pittsworth, Barcaldine, Winton, and Cloncurry. Imbued with a fine sense of citizenship, he became identified with the progressive movements and social services of every community in which, for varying periods, his lot was cast. In returned soldiers' organisations, he was an acknowledged leader. In expressing his keen regret at the untimely loss of such an excellent officer, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, said: "The death of Mr. Dunn has removed from the service of the Department one of our most brilliant and conscientious officers. Mr. Dunn, who had served in various parts of the State, was one of our most experienced officers. His passing is a great blow to the branch to which he was attached. I extend my sincere condolence to his wife and family."

Animated by the real A.I.F. Digger spirit, especially during his last illness, which probably had its origin in the rigours of desert campaigning, and possessing a cheerful, tolerant disposition and other fine qualities of heart and mind, Fred Dunn is greatly missed by his colleagues and a wide circle of friends, especially in the country districts in which he was so well known and esteemed.

For his sorrowing widow and young family of three sons and a daughter, and also for his father, deep sympathy is felt.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.

Carob Bean.

W.S.F.R. (Mondure)—

The Carob Bean does well in the cooler parts of the State, and should grow well at Mondure. Seeds are best sown about April. They germinate readily enough, but if you have any difficulty with them try pouring hot water over the seeds, allowing the water to cool and the seeds to remain in soak for about twelve hours.

The trees bear in about seven years, sometimes earlier, before a fair-sized crop is available. The nutritive value of the pods is very high. A thousand pods is a very good crop for a single tree.

The trees are male and female, although sometimes hermaphrodite flowers occur, and sometimes the female will bear pods without the presence of the males. Male trees bear only male flowers and, of course, no pods.

Wild Sunflower. Wild Zinnia. "Poverty Grass."

A.L.P. (Kingaroy)—

1. *Verbesina encelioides*, the Wild Sunflower. This plant is very common in Queensland, especially as a regrowth on the brigalow scrub areas in the Darling Downs and Maranoa districts. Feeding tests have shown that it is poisonous to sheep, producing in them symptoms resembling those of pneumonia.
2. *Zinnia pauciflora*, Wild Zinnia, a native of tropical America, now a naturalised weed in Queensland. It has become very common in parts of the State, especially on the Darling Downs and in the Lockyer District. It is not known to possess any poisonous or harmful properties; nor is it a particularly aggressive weed, although fairly common.
3. *Eremochloa bimaculata*. The only local name we have heard applied to this grass is Poverty Grass. It generally grows on rather poor country, and our experience is that it is not particularly valuable as a fodder. We have, however, no analysis of it.

Gomphrena Weed.

J.B. (Ipswich)—

The specimen is the Gomphrena Weed (*Gomphrena decumbens*), a native of tropical America. This plant made its appearance about Townsville some years ago, and since then has become very widely spread in the State. It belongs to a wholesome family (Amarantaceæ), and theoretically should be a very good fodder. We are interested therefore in your report that cattle were eating it freely. We also have had a report to the effect that horses were very fond of the seed heads. Personally, though we have seen a lot of the plant, we cannot say we have seen stock take to it to any extent. It is not a clover, and is not related to the clovers. It is not a cross between Khaki Weed and Pig Weed, although it belongs to the same family as the former (Amarantaceæ). It is possible to cross one plant with another, but they must be closely related botanically.

An Acclimatized Plant.

L.C. (Gayndah)—

The specimen you sent is *Phaseolus lathyroides*, a native of tropical America, naturalised many years ago in Queensland as a fodder. The plant is not known to possess any poisonous or harmful properties, but so far as our experience goes, stock do not take readily to it. We have received reports on several occasions, however, from farmers, to the effect that cattle, and especially horses, ate it once they had acquired a taste for it. I have not heard a common name applied to the plant.

"Wild Sage."

C.M. (South Townsville)—

The weed *Hyptis suaveolens* is sometimes called Wild Sage or Wild Mint. It is a strongly scented herb, growing 2 to 6 feet high. The stem and leaves are hairy, the leaves are opposite, and the flowers blue and borne in whorls in the upper part of the plant. This plant is quite common about Townsville and some other places in North Queensland, and if you send us a specimen we shall let you know whether it is the right plant. It is sometimes burnt by fishermen to drive away mosquitoes and sandflies.

We would be pleased to report on any specimens of weeds you care to send. Small pieces of the plant, bearing, if possible, flowers or fruits, would suffice.

"Wild Millet."

P.R. (Pittsworth)—

Your specimen is *Echinochloa crus-galli,* commonly called Wild Millet, though this name is applied to a number of grasses in Queensland. It is very widely spread over the warm temperate regions of the world, and the form you send is one that is fairly common as a weed of cultivation in Queensland. It is quite a good fodder, relished by stock, and is very closely allied to such well-known cultivated fodders as Japanese Millet and White Panicum.

Saffron Thistle.

A.M.R. (Toowoomba)—

The specimen is *Carthamus lanatus,* the Saffron Thistle, a native of the Mediterranean region, now a very common weed in Australia. It is much more abundant in the Southern States than in Queensland. It has been gazetted a noxious weed throughout this State. It is not known to possess any poisonous or harmful properties, but is of little or no use as a fodder. In spite of its spiny nature, it is sometimes eaten in its young stages by stock.

Crowfoot Grass.

H.McB. (Millmerran)—

The specimen is the Crowfoot Grass (*Eleusine indica*). This grass is, of course, not to be confused with the herbage commonly known as Crowfoot. It is very common on parts of the Darling Downs and Maranoa in certain seasons. This grass in very widely spread over the warmer regions of the world, and in Queensland mostly grows as a weed of cultivation, or around cowyards, &c.—in fact, anywhere where the ground has been disturbed, or broken. It is readily eaten by stock, but, like sorghum and some other plants, contains a prussic-acid-yielding glucoside. Recent tests by the Agricultural Chemist show that most of the poisonous principle resides in the seeds. The plant is very common in the coastal parts of the State, and rarely causes any trouble.

Coffee Senna. Wilga.

W.A.K. (Clermont)—

The specimen is, as you suspect, *Cassia occidentalis,* the Coffee Senna.

Wilga Trees: Although we have been through a great deal of Wilga country, we do not remember ever seeing seedlings under the trees, and do not think they sucker. People tell us that they have had trouble in germinating the seeds. We should think the best plan would be to get the seed perfectly fresh, and sow in flats or boxes in fairly sandy soil, and keep them moist. Under these conditions they should germinate within two or three weeks. They could then be pricked off into tins or other boxes, and eventually transferred to their permanent positions. I think they should transplant fairly well. It certainly is a beautiful tree, and would make an excellent small street tree for much of Western Queensland.

"Balloon Cotton."

E.N. (Rannes)—

The specimen is the White Cotton or Balloon Cotton (*Asclepias fruticosa*), a native of South Africa, now a naturalised weed in Queensland. It is sometimes grown as an ornamental bush, but has the possibilities of becoming a very serious weed. We have seen some farms almost overrun by it. When it makes its first appearance—as it has on your property—the best way to get rid of it is to pull it up before the plants start seeding.

Carpet Grass. Buffalo Couch.

D.C. (Beenleigh)—

The narrower-leaved grass is Carpet grass (*Axonopus affinis*). This grass is very common in parts of Queensland and New South Wales, and has some value on second-class country. It has caused considerable concern, however. in recent years because of its invading better class Paspalum, Rhodes, and Blue Couch pastures, and seriously reducing their carrying capacity. If you have only a small patch, we would feel inclined to cut it out if at all possible, or plough and replant with Paspalum or Blue Couch cuttings, whichever is doing better on your place.

The broad-leaved grass is the Buffalo Couch (*Axonopus compressus*). This grass is very similar to the Carpet Grass, but on the whole is somewhat superior.

A "Native Flax." "Nut Heads."

F.H.D. (Kuranda)—

The plant of narrow upright growth is *Pimelea cornucopia*, one of the several plants known as Native Flax. It is very common in North Queensland. Several species of Pimelea have been accused of poisoning stock, but no feeding tests have been carried out with the present species. It has not come under suspicion, but we cannot say we have ever seen stock eat it, at least to any extent.

The plant of more spreading habit is *Epaltes australis*, commonly known as Nut Heads because of its little brown seed heads. It is very common as a weed in coastal pastures. It is eaten to a limited extent. It is not known to possess any poisonous or harmful properties, but we should say was of no particular consequence in the pasture.

"Josephine Burr."

S.C. (Barcaldine)—

The specimen is the Josephine Burr (*Josephinia Eugeniæ*), a native plant with a fairly wide distribution in the Central West. The burrs are sometimes a common infestation in wool. If only a few plants are on the property it would be as well to cut them out before the burr gets too much of a hold.

Tridax Weed. Leafy Panic Grass.

N.R.K. ((Grantham)—

1. *Tridax procumbens*, Tridax Weed. This weed is very common in Queensland in the northern parts of the State, and in recent years has spread to the more southern parts, though it does not seem to become such a pest as in the warmer localities. It is not known to possess any poisonous or harmful properties, and we have seen stock eat it readily enough at times when grass was very short. If you have a small area of it, however, it would be as well to cut it out if practicable.
2. *Brachiaria foliosa*, Leafy Panic Grass. This is quite a good grass for dairy cattle. Though a native grass, it occurs most frequently in country where the ground has been broken or disturbed, such as old cultivation paddocks. It does not often form a permanent sward, though we have seen it doing so on sandy alluvial flats.

A Love Grass.

W.B. (Chinchilla)—

The specimen is one of the Love Grasses (*Eragrostis sororia*). The Love Grasses are very common constituents of the average native mixed pasture. The one you send is one of the commonest. Though not particularly important in themselves, the Love Grasses can be regarded as good secondary grasses in the mixture.

In reply to your inquiries—

1. Is it good for sheep or cattle?—A good secondary grass.
2. Is it fattening?—Not particularly so.
3. Is it good feed when the winter comes after frost has been on it?—It stands the winter moderately well, but, like most of the native grasses, loses a lot of its nutritive value after it has grown and seeded, say, in late summer or early autumn.
4. Is it a hardy grass?—Yes.

A Common Yam.

A.H.F. (Miriam Vale)—

The common yam dug up in cultivation paddocks about Baffle Creek is a native Grape (*Vitis opaca*). This is of a very stringy, fibrous nature, and is often pink-fleshed.

There are other vines, of course, and there is a *Dioscorea* common about Baffle Creek (*D. transversa*). A portion of the dead vine, particularly if a few shrivelled leaves could be found, might have enabled us to identify the plant more accurately.

We do not think the Native Grape yam has any value as a pig and poultry food, but the *Dioscorea*, of course, has; as a matter of fact, some people eat the the *Dioscorea* bulbs, and say they are quite pleasant and palatable.

Brookfield Plants Named.

J.McL. (Brookfield)—

1. *Vicia sativa*, the common Vetch. This plant, a native of Europe, is now widely spread over most of the temperate regions of the world. It belongs to the family Leguminosæ, and is regarded as quite a good fodder.
2. *Amarantus viridis*, Green Amaranth. This plant is a very common weed in Queensland. The leaves may be used as a substitute for spinach.
3. *Verbena venosa*, Wild Verbena, a native of South America, now a naturalised weed in Queensland.
4. *Soliva anthemifolia*, Soft Burr. This plant is a fairly common farm and garden weed in Queensland, but is not particularly aggressive.

VETERINARY ADVICE.

(Selections from the outgoing mail from the office of the Director of Veterinary Services.)

Disease in Fowls.

W.E.C. (Chinchilla)—

From your description, your fowls are suffering from spirochaetosis, a disease transmitted by fowl ticks and red mites. Although you state that there are no ticks on the fowls infected, this may not be so as fowl ticks are very hard to detect when present in only small numbers. Examination of the fowls is only successful at night, when the parasites are feeding.

The only method of dealing with the disease is to eradicate the ticks and mites which spread it. Treatment of the disease itself does not pay, as it would cost considerably more than the value of the bird.

In the case of old fowlhouses, where the timber is rotten and infested with white ants, the best thing to do is to burn them and rebuild with sawn timber. Disinfection can be done by spraying with kerosene emulsion or sheep dip. Special attention should be paid to crevices and joints in the timber.

Kerosene emulsion is made by preparing a stock solution by dissolving one pound (1 lb.) of washing soap in one gallon of water. Then pour in slowly one gallon of kerosene, stirring to a creamy consistency. Use one gallon of this solution to eight (8) gallons of water for spraying. This should be repeated every five days until the ticks have been eradicated.

Perches should be hung on wire passing through a cup of kerosene. Old whitewash should be removed before spraying as the scales form a hiding place for the parasites.

Colostrum.

G.R.W. (Woodford)—

There is no real substitute for colostrum and, provided the calf has two or three feeds of colostrum from the mother, no more would be required. In the event of getting no colostrum whatever, the calf can be allowed whole milk to which has been added two tablespoonsful of lime water.

Colostrum should not be mixed with ordinary milk as it would certainly lower the grade of cream.

Rural Topics

Carrots for "Denis."

New Zealand farmers have come to appreciate the fact that carrots are a first-class feed for pigs, and that with a reasonable amount of attention in the early stages of growth to keep down fast-growing weeds, heavy tonnages can be produced from a carrot crop.—*The New Zealand Farmer Weekly.*

How Ensilage is made in Argentine.

According to a letter received recently from Argentine, the long-trench method of making ensilage has solved the problem of economically conserving supplies of winter fodder by Argentine farmers. The writer says that Argentinians usually employ two methods—that is, stacks or long trenches similar to those farmers use around Pittsworth and other places on the Darling Downs. The usual procedure to offset cartage and handling of the freshly-cut material intended for ensilage-making—which, in South America, is lucerne as a rule—is to select sites for stacks in different positions in the paddock and cut all available lucerne around the site of the stack.

Two stacks are invariably built at the same time on each site, working alternate days or half-days on each stack, so as to allow the freshly-stacked green lucerne to settle down and to prevent the stacked material from slipping. On big farms only medium-height stacks are built on foundations where the earth has been dug or excavated to a depth of about 2 feet. When the stack is settling, a portion of the excavated earth is taken and stacked on top to assist the settlement of the mass of material by the additional weight of the "spoil," and when the stack has settled, the sides are earthed up to the eaves of the stack of fodder and the whole stack is covered completely with earth, with the exception of corner apertures for drainage and moisture to escape from the green ensilage material.

The same principle is adopted on many farms, but by excavating a long trench from 10 to 12 feet wide, about 2 feet deep, and up to 150 feet long, sloping at each end to permit of the wagon or sweeps carrying the freshly-cut lucerne to be carted right over the top of the trench stack, and, when finished, covering the trenched material with clay.

Ensilage produced under this method is said to last indefinitely, as long as the outside covering of earth is renewed regularly to prevent the contents of the stack from coming into contact with the outer air.

Lucerne an Adaptable Crop.

Years ago, no one ever dreamt of lucerne as a fodder crop on any land except rich alluvial flats. It was believed that without plenty of soil it would not grow successfully. Now we know much more about this remarkable fodder plant, and especially of its adaptability to many types of soil and different climatic conditions. In its search for water it puts up some remarkable performances. For instance, on a Queensland farm recently lucerne roots were traced for 70 feet in their hunt for water.

In lamb-raising country it has done well, even under adverse seasonal conditions. Queenslanders will be interested particularly in a report from the edge of the Mallee country in Victoria, where the rainfall is under 15 inches in normal years and which describes the experience of a farmer who has 500 acres of lucerne sown with wheat in rotation. He started very cautiously five years ago by planting 6 oz. of lucerne seed to the acre. Now he uses three times as much. After putting in his wheat and fertilizer (about a quarter of a hundredweight of superphosphate to the acre) he sows his lucerne seed, which passes through the grass-seed box on the drill.

During a very dry time about three years ago—the local rainfall for that year was only 8 inches—sand silted over some of the plants, but in many parts of the paddock the lucerne held back the drift. In the summer of 1938-1939, sheep were getting a short green bite on the ridges. On this property the lucerne normally carries two sheep to the acre. One paddock has been in use for experimental wheat crops. It was ploughed after being under lucerne for three years and planted with wheat without having been fallowed. The wheat yield from this paddock was not only as good as that from the fallowed fields, but it failed to kill the lucerne, which afterwards came on vigorously.

Pumpkins as Stock Food.

Farmers in the Hawkes Bay district in New Zealand have been getting excellent results from their pumpkin crops as pig feed. Commenting on this, one farmer had this to say in the local paper:—"Excellent as they are for finishing pigs, pumpkins are even better in combination with hay as a fattening feed for lambs."

Co-operation.

A co-operative association is not operated to make a profit on invested capital above the usual rate of interest, but to profitably market the products of its members at the lowest possible cost.—*The New Zealand Farmer Weekly.*

Tractor Fuel Substitute.

A gas producer unit suitable for transport vehicles with a carrying capacity of from 1 to 5 tons, and which might well be fitted to farm tractors, has been successfully demonstrated in England.

By means of this plant imported fuels (both petrol and kerosene) are dispensed with and the truck or tractor is run from the products of charcoal, low-temperature coke, coal, or a mixture of these fuels. In efficiency, the fuel is stated to be equivalent to petrol, and its cost 4½d. to 5d. a gallon.

The plant weighs only about 3 cwt.

A Crop Rotation Experiment.

Maize and oats are two important commercial crops in the New England district of New South Wales. With these crops a crop rotation is now in progress at the district experiment farm. The plan of the experiment is twofold—yield and soil fertility. Greater interest is centred on the more spectacular achievement with acre and period production of the cereal crops—maize and oats—by rotation cropping. The work on soil fertility has not gone far enough yet to permit of definite conclusions.

The experiment, which has been in progress for about nineteen years, has already shown that greater acre yields, greater period production, less labour and expense, and increased profits will be obtained with the inclusion of perennial red clover in a rotation.

Marketing "Frosted" Meat.

A new step in marketing "frosted" meat and other perishable products was inaugurated in New York State recently. The foodstuffs are packed in insulated paper-bags with a piece of "dry ice" sufficient to maintain a low temperature during delivery over distances of as far as 50 miles.

Cattle Fattening on Wet Coastal Country.

To determine the real value of introduced grasses for topping-off cattle on wet country in the North, where the rainfall is usually measured with a foot-rule, regular weighing of experimental cattle is carried out on a Tully River property. The results of one weighing show that phenomenal gains in weight were recorded. One lot of cattle gained as much as 71 lb. in weight in three weeks. The actual average of this mob in increased weight was 71.2 lb. a head. Another experimental mob gained 40.5 lb. a head; so the average gain of all the cattle during a three-weeks period was approximately 50 lb. a head. These results are very interesting and indicate what can be done in the way of fattening on introduced pastures on the wet tropical coast. With well-established improved pastures and improved classes of cattle, the possibilities of this new practice are obviously immense.

Lambing Percentages.

A practice which should be more general, and which would increase lambing percentages—a very important matter these days—is the re-joining of rams with dry ewes at lamb marking time. This, of course, depends on prevailing seasonal conditions.

Pigs in the Orchard.

A dozen unringed pigs let loose in the orchard for a fortnight will not only clean up everything in sight, but they'll do a thoroughly good job of cultivation as well. That is the opinion of a fruitgrower on the North Coast. Discussing the pig-fruit combination the other day, he said that pigs are great workers in the orchard. They clear the ground of windfalls, root around the base of the trees, just like a gardener with a fork, and then work outwards to cover the whole area.

Fowls also earn their keep in a fruit garden.

The Plough a Weapon of War, as well as a Weapon of Peace.

The plough is as necessary a weapon of war as any instrument of destruction. It is helping the ship to carry munitions instead of foreign food. It is warding off danger from these shores. But, unlike the gun or the aeroplane, the plough is a weapon of peace. It is creating wealth for the future and wealth that the country will always need. For, after this great war effort, there can be no question of drifting back, as we drifted back in the years after the last war. Having seen the value of the land in time of stress, we must never waste it again in the days of peace.

—*The Farmer and Stock-Breeder* (England).

The "Topato."

The crossing of potatoes with tomatoes for the production of a crop above and below ground from the one plant has long been a stock joke at show dinners, but it can be done and has been done, according to a report by research workers in the United States. This is how they did it: Tomato tops were successfully grafted on to potato roots and, in due course, the top of the plant produced tomatoes and the roots potatoes. The potato produced is starchless, and, the report says, "hailed as a boon to stout women who like potatoes, but shun them for fear of excess poundage." The name of the new product is "topato."

Plate 90.

AT THE SUGAR SCHOOL AT GATTON THE "SMOKO" CART WAS ALWAYS POPULAR.

Farm Notes

JUNE.

THE wheat planting season normally extends from April to July, with the main Darling Downs sowing during June. Well-prepared fallows should contain enough moisture to permit of sowings after light showers, but on recently ploughed lands it will be necessary to await substantial rains or commence sowing dry when the surface soil has dried out sufficiently to avoid the malting of grain. Farmers unfamiliar with the characteristics of the different varieties of wheat should remember that, in general, early-maturing varieties should be sown late, and slow-maturing varieties sown early.

Of the varieties in general cultivation at present, Florence, Novo, and Seaspray are early maturing, while Currawa and Cleveland are slow maturing.

All others are classified as medium, early, or mid-season, with little difference in the number of days taken to mature under identical conditions.

All seed wheat should be treated for the prevention of ball smut, using copper carbonate or either of the mercury dusts "agrosan" or "ceresan."

Where dry conditions have prevented the earlier seasonal sowings of oats, barley, wheat, field peas, and other field crops, there is still time to profit by so doing, choosing early-maturing varieties which will make satisfactory growth before the normal warm, dry spring conditions commence.

With all fodder crops for grazing, greater value is obtained from a number of small paddocks which may be grazed in rotation.

Land intended for maize should now be ploughed to a depth of at least 9 inches, and allowed to lie in the rough until early spring, the action of frost and rain having a mellowing effect on the soil.

Paddocks set aside for the July and August planting of potatoes should also receive attention, as adequate preparation of land is one of the most important factors in successful agriculture.

Farmers desirous of destroying useless green timber or undergrowth with arsenic pentoxide are reminded that the April to July period is probably the most effective time for carrying out this work. Frill ringing and poisoning of trees with a 20 per cent. solution of arsenic pentoxide has proved very satisfactory, combined with the felling and swabbing of butts to destroy suckers and undergrowth. Shelter belts and shade trees should always be reserved when planning poisoning or ring-barking operations.

Winter is generally the best time to undertake the laborious work of ring-barking, clearing, fencing, and roadmaking.

Recently harvested maize grain should be allowed to dry out completely before being shelled, otherwise heating in the bags may occur.

Grain not required for immediate use or sale can be stored indefinitely at no great cost, other than the initial outlay for tanks and occasional fumigation to destroy weevils.

THE VALUE OF MITCHELL GRASS.

Where it has spread in the north-western districts of New South Wales, Mitchell grass is said to have added one-third to the value of the land, and that is regarded as a conservative estimate. In the last ten years it has spread remarkably and has made a big difference to large areas of pastoral country in the north-west of the neighbouring State. Mitchell grass seed from the district has been sold as far afield as the Kimberleys, in Western Australia, and South Africa.

To Queenslanders, of course, the value of Mitchell grass need not be told. It is one of our greatest pastoral assets and science men of the Department of Agriculture and Stock are already keenly on the job of preserving it and extending its growth.

Orchard Notes

JUNE.

THE COASTAL DISTRICTS.

IF the weather is dry, citrus orchards should be kept in a good state of tilth and winter green manure crops turned under. Old worn-out trees may be dug out and burnt. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes very cold, or if immature fruit is sent South, the fruit is apt to turn black and become valueless. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

The pineapple plantation should be shallow-worked and kept free from weeds. The fruit takes longer to mature at this time of the year, consequently it may remain on the plant until partly coloured before gathering for the Southern markets.

Banana plantations also should be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now may mean small fruit later on. Bananas should be allowed to become full before the fruit is cut. The necessity of proper handling, grading, and packing of the fruit should be kept in mind. Land intended for planting with bananas or pineapples during the spring should be prepared now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall, they should be watered regularly. Where not already done, vineyards should be cleaned up ready for pruning. It is, however, too early to prune or to plant out new vineyards.

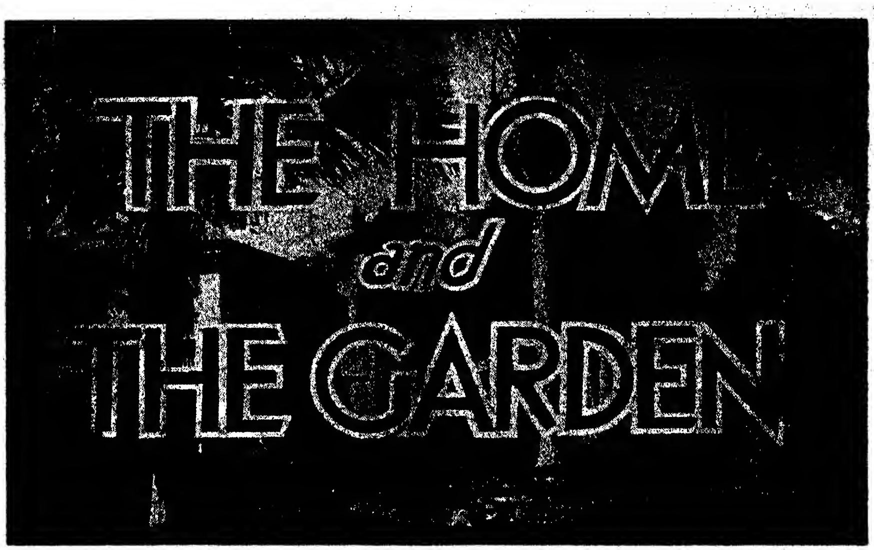
THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt. Thin out young trees properly, and cut them back hard. Many good trees are spoilt by insufficient or wrong pruning during the first three years. If in doubt as to the cofrect method of pruning, consult the district instructor in fruit culture. In old orchards, do not have too much bearing wood; cut out severely, especially in the case of peaches. Planting may be commenced where the land is ready, as early-planted trees become well established before spring, and thus get a good start. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour or badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or phosphates—may be applied now, as they are not liable to be washed out of the soil, and will be available for the use of the trees when they start growth in spring. Lime may also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees may be pruned now, and vines also may be pruned in any district where there is no risk of late frosts. Prunings should be gathered and burnt, and the vineyards ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls. The moisture can be kept in the soil by cultivation afterwards.

Citrus fruits will be at their best in the western districts. The trees should be watered if they show signs of distress; otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should have been picked by this time.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH: NATION'S WEALTH.

THE CARE OF BABY'S FEET.

"Ten little fingers and ten little toes." With what admiration does the young mother touch the tiny hands and feet of her baby as he lies kicking in the sun—and rightly so, because in babyhood the human foot is one of the most beautifully shaped parts of the body. Not only is the normal foot of the baby beautiful in form, but it is extremely supple. Watch baby for a few moments as he alternately curls up and stretches every part of his foot and you will realise that the range of movement almost approaches that of the hand. Surely the mother should try to understand and appreciate the value of this particular gift of Nature to her child and take great care not to spoil it. "But how can I spoil it?" she may ask. I would advise her to go down to any of our beaches and watch not the bright faces and well-shaped figures of the bathers as they pass her by, or the patterns of their swim suits, but the shape of their feet. What a sorry sight most of them are, especially the women's feet with their distorted and misshapen joints telling the story of loss of function and unnecessary suffering caused by the neglect or ignorance of the parents and others who cared for these people in their childhood. Unfortunately this lack of knowledge will make it impossible for the nothers of to-day ever to attain a perfect foot, but we shall now think for a few minutes about the feet of the babies of to-day and see whether we can help to preserve their beauty right into adult life.

The Structure of the Foot.

We have noted the beauty and suppleness of the foot, now let us think of the wonderful structure of it. To help us to do this we can make a mental picture of the grace of the ballet dancer or the athlete lifting heavy weights, with his feet supporting not only his own body, but the hundreds of pounds he is lifting, or the runner dashing down the hundred yards in less than ten seconds, and we will surely

marvel at the combined strength and flexibility and the absolute perfection of the feet for the work they are designed to do. The foot is a remarkably complicated structure. It is arranged in the form of two arches—a long one starting from the heel to the toes, a short one from the inside to the outside of the foot. The formation may be compared to a dome. Normally the weight of the body is borne by the strong bone at the top of the long arch, and is passed on through the rest of the bones forming this dome-like part of the foot to heel and toes. It is the very strength of the feet that makes them so troublesome when they are mistreated or get out of order. They were designed to be a powerful ally when a man hunted his game or ran from his enemy, and were made for speedy action and almost unlimited endurance, but they were also made to be free and should be so as much as possible.

Let us now consider what often happens to baby's feet to prevent their being used as Nature intended them to be. Right from birth they are usually encased in knitted woollen bootees, made perhaps by a friend who wishes to present what she thinks will be a useful gift to the newborn baby. Normally the well-meaning friend has no knowledge of the form of the foot and its importance and the bootees are made to end in a point at the toe instead of being square and loosely fitting. Their immediate effect is the bunching together of the toes and interference with those free and natural movements we mentioned earlier in this talk. The bootees require frequent washing and being made of wool they shrink, becoming smaller and smaller. At the same time baby's tiny feet are growing at a surprisingly rapid rate with the result that week by week the deforming influence of the bootees is slowly but surely at work. By the time baby is old enough to wear shoes the power to use the important muscles of the feet is weakened and the feet are gradually becoming more rigid and out of shape. Now the feet are fitted with socks, the toes of which in many instances are also pointed, and these, if closely woven and tightly fitting as they often are, cause further cramping of the feet. As the child grows older he is made to wear shoes of a more rigid type, usually not built to the shape of the natural foot and so the deforming influence continues. Long before the shoes are worn out the child outgrows them and from motives of economy his feet may be forced into his shoes. It is better that a child should go barefoot than that he should be made to walk in shoes that are too short for him just because they are not worn out.

A Common Error.

A common error is the wearing of shoes much too short for the feet. When fitting on shoes allow baby to stand in them and see that there is about a quarter of an inch to spare beyond the limit of the great toe. If this is not done the toes become bent up and permanently deformed. By the time the child reaches his or her teens, fashion begins to play its pernicious part. The young man often selects a shoe which is too narrow across the foot and pointed at the toe. Ingrowing toe nails, painful corns, painful joints, callosities and stiff toes are some of the disabilities which so often occur even in the feet of young men, but it is in the young women that one finds the most disastrous results of the wearing of ill-fitting and badly-shaped shoes. Many girls to-day at the age of fifteen or sixteen years are not content with wearing a properly-fitting shoe with a broad flat heel and ample toe-room but must imitate older sisters and cram their feet into shoes with high heels of court style much too short, narrow, and pointed. Cramped into them like vices the young feet are compelled to complete their growth, moulded to the shape of the shoes. The result is that extensive operations require to be carried out in a number of cases to correct the crippling which has taken place. Specialists who have made a careful study of the subject maintain that no heel should be higher than 1¼ inches, and for every quarter of an inch added the foot is going to suffer proportionately. Most women's shoes have heels in the region of 2 inches high, and many are higher, and unfortunately one becomes accustomed these days to see women tottering about in an ungainly manner—all the natural grace and balance of the body lost. We have no cause to smile at the Chinese parents of earlier generations who permitted their daughters' feet to be deformed by binding them in infancy, when we in our modern civilisation allow our children's feet to be deformed as surely by the wrong kind of footwear. The effect of wearing a high heel is to shorten the strong tendon (tendo Achilles) at the back of the heel, so that many women are unable to flex their feet to more than a right angle. Further, the weight of the body is thrown more on to the balls of the toes, which, in time, become very painful. Most shoes are too narrow and many are too short—consequently, we find that certain of the bones are forced out of position, all kinds of deformities occur, and standing and walking becomes increasingly painful and

difficult. We appeal to mothers, and fathers also, to see that right from infancy baby's footwear is fashioned to fit the foot, and not the foot to fit the shoe or stocking; that the heels of shoes should be low and broad, and the toes square, or at least well rounded, and that the soles have flexible welts, not hard, rigid soles or pump soles. In addition, parents, and teachers, too, should teach children, not only to care for their teeth and their hands, but to realise the wonder and beauty of the structure of their feet, to cultivate a proper pride in preserving the strength and shapeliness of this most ill-used of our members.

In our talk next month we shall tell you about certain deformities which may occur as a result of conditions which arise before birth, and which will require special care and attention during childhood.

You may obtain information on this and other matters concerning infant and child welfare by visiting the nearest Maternal and Child Welfare Centre, or by addressing a letter to "Baby Clinic, Brisbane." Such letters need not be stamped.

IN THE FARM KITCHEN.

THE HOMELY SAUSAGE.

There are other ways of cooking sausages besides frying and grilling. Here are some of them:—

Sausage Surprise.

Prick 1 lb. pork sausages with fork or skewer and place in boiling water and simmer very gently for 6 or 7 minutes. Drain and allow to cool a little, then skin. In the meantime, fry 4 oz. rice in a little butter or good dripping until a fawn colour; with 1 tablespoon minced or grated onion, add 2 cups well-flavoured stock, tomato puree, or 1 cup water and ½ lb. skinned and chopped tomato. Add pepper and salt to taste and cook until rice is tender and moisture absorbed. Mix rice well to a mush, then spread on to a dish to cool. Cut sausages in halves and roll round enough rice to cover thoroughly. Now dip in egg, then in fine breadcrumbs. Fry in boiling fat until a golden brown. Drain well and serve with mashed potatoes and a well-flavoured tomato sauce.

Sausages Au Gratin.

Skin sausages in the same way as preceding recipe and place them in a flat, well-buttered ovenproof dish. Cover sausages with very thin slices of potato and cover with the following sauce:—Melt 1 tablespoon butter or good dripping in a saucepan, add 1 tablespoon flour, cook a little, then add 2 cups milk or 1 cup vegetable stock and 1 cup milk, and stir until mixture boils. Simmer for five minutes, add pepper, salt, and a little cayenne and 2 tablespoons grated cheese. Pour over sausages, &c., sprinkle with a little more grated cheese, and bake in a moderate oven until well browned.

Devilled Sausages.

Mix together 2 cups fairly thick brown sauce, 1 teaspoon made mustard, 1 tablespoon Worcestershire sauce, 2 tablespoons tomato sauce, and a dash of cayenne. Skin sausages as previously directed and spread with sauce. Place under griller and brown or put them in a hot oven for about 15 minutes. Serve with grilled tomatoes and saute potatoes.

Grilled Sausages and Pineapple.

Boil as many pork sausages as directed, then grill in the usual way until well browned. Roll edge of pineapple (tinned or fresh), cut into ½-inch slices, in a little sugar tinted red with cochineal, and fry quickly until a nice brown. In the meantime, scrape and cut as many carrots as are needed into cup shapes, using a vegetable scoop to cut out the centres. Boil in salted water until almost cooked, then drain and add 1 dessertspoon butter and 2 teaspoons brown sugar. Continue to cook until tender. Cook 1 lb. peas until tender, then rub through a sieve. Add pepper, salt, and a little butter, then fill carrot cups. To dish up, place a little mashed potato in the middle of dish, pile up sausages neatly, then place pineapple slices neatly round. In the centre of pineapple place a prepared carrot cup. A roll of bacon may be placed on top of peas or round sausages.

Sausages Florentine.

Cook 1 or 2 bunches of spinach, drain well, and chop very finely or rub through a sieve. Season with pepper, salt, and a little grated nutmeg. In the meantime, peel and slice 1 lb. onions and fry until brown in a little butter or good dripping. Season with salt and pepper. Grease a fireproof dish and add a layer of spinach, then a layer of onions, and 1 lb. sausages, previously boiled, skinned, and cut through the middle lengthwise. On top of these place another layer of spinach, then a thick layer of skinned and thickly-sliced tomato. Sprinkle with pepper, salt, and coarse breadcrumbs. Dot with a little butter or good dripping and bake in a medium oven for 45 minutes.

Grilled Pork Sausages with Glazed Sweet Potato.

Boil and skin as many sausages as required and put in a baking dish with a little melted butter and about 1 tablespoon top milk or cream. Place under griller and cook until a nice brown all over, taking care to turn them well during the cooking. Parboil sweet potatoes (large), allow to cool a little, then cut in halves. Place in a greased baking dish or fireproof dish and cover with the following:—Melt 1 tablespoon butter with 1 tablespoon brown sugar and 1 tablespoon water in which the potatoes were boiled. Add a little ground cinnamon and boil for a few minutes. Bake in hot oven until tender, basting well with the syrup during the cooking. Dish sausages in centre and surround with potatoes. Garnish with rolls of crisp bacon.

Sausage Omelet.

Skin and cook 1 lb. sausages as directed, cut into thin slices or dice. Beat eggs slightly (allow two per person), add pepper, salt, and a little chopped parsley. Melt a little butter or good dripping in an omelet pan, pour in egg, then enough sausage slices to cover egg. Stir well over moderate gas until almost set, then push mixture to one side of pan cushion shape and allow to brown. Carefully turn and brown the other side without allowing omelet to become overcooked. Dish up and serve at once with crisp grilled bacon.

OTHER DISHES.

Savoury Fritters.

Make a mixture as follows:—Place 1 oz. butter in saucepan with ½ cup water and bring to boiling point. When butter is quite melted, add 2 oz. plain flour and stir over gas until it leaves the sides of saucepan clean. Allow to cool a little, then beat in 2 whole eggs, one at a time, and beating well after each egg is added. Add pepper and salt to taste, and, if liked, a little chopped parsley. Drop in dessert-spoonfuls in very hot, but not boiling, fat and cook over a moderate gas until well risen, brown, and crisp. Take up and drain. Fill with any left-over meat, vegetable, &c., finely chopped and well flavoured, and mixed with enough sauce to bind mixture together. Make hot before filling puffs, then serve at once with a well-flavoured sauce.

Rice Cakes.

Fry 1 medium-sized finely-chopped onion in a little good dripping until soft, but not brown, then add 1 cup rice and cook until a fawn colour, stirring all the time so it will not burn. Add 2 cups stock (any left from cooking vegetables will do) and cook until rice is tender and moisture absorbed. Add 1 dessertspoon shredded and fried bacon and mix well. Form into flat cakes and place on a well-greased baking tin. Sprinkle with buttered breadcrumbs and bake in a hot oven until brown. Dish up on a round of buttered toast the same size as rice. On top of rice put a slice of grilled tomato.

Apple Cottage Pudding.

Sift 1½ level cups plain flour with 2½ level teaspoons baking-powder and ½ level teaspoon salt. Cream 2 oz. butter until light and gradually add 1 level cup sugar and beat well. Add 1 egg and a little lemon essence. Add flour alternately with a little more than ¾ cup milk, but not quite a cupful. Mix until smooth, then add 1 or 2 grated apples. Melt 4 level tablespoons brown sugar with 1 level tablespoon butter and pour in the bottom of a round cake tin. Sprinkle over enough raisins to cover bottom, then cover raisins with peeled, cored, and sliced apples. Add batter and bake for about 45 minutes. Turn out and serve.

ASTRONOMICAL DATA FOR QUEENSLAND

JUNE, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON. AT WARWICK.

June.	SUN. Rises.	SUN. Sets.	MOON. Rises.	MOON. Sets.
	a.m.	p.m.	a.m.	p.m.
1	6.35	5.5	10.57	10.28
2	6.35	5.5	11.38	11.26
			p.m.	
3	6.35	5.4	12.19	nil
				a.m.
4	6.35	5.4	12.59	12.27
5	6.36	5.4	1.42	1.28
6	6.37	5.4	2.27	2.31
7	6.37	5.4	3.14	3.36
8	6.37	5.3	4.6	4.42
9	6.38	5.4	5.2	5.48
10	6.39	5.4	6.1	6.52
11	6.39	5.4	7.1	7.52
12	6.39	5.4	8.2	8.46
13	6.39	5.4	9.2	9.36
14	6.40	5.4	10.0	10.21
15	6.41	5.4	10.55	11.1
16	6.41	5.4	11.48	11.38
				p.m.
17	6.41	5.4	nil	12.13
			a.m.	
18	6.42	5.5	12.39	12.48
19	6.42	5.5	1.31	1.23
20	6.42	5.5	2.22	1.59
21	6.42	5.5	3.13	2.37
22	6.42	5.5	4.5	3.17
23	6.43	5.5	4.55	4.1
24	6.43	5.6	5.46	4.48
25	6.43	5.6	6.37	5.38
26	6.43	5.6	7.26	6.32
27	6.43	5.7	8.12	7.27
28	6.43	5.7	8.57	8.23
29	6.43	5.7	9.39	9.21
30	6.43	5.8	10.20	10.20

Phases of the Moon.

3rd June, First Quarter, 7.56 a.m.
9th June, Full Moon, 10.34 p.m.
17th June, Last Quarter, 1.45 a.m.
25th June, New Moon, 5.22 a.m.

MIDWINTER.

ONCE again the whirligig of time has brought winter to all the Southern Hemisphere. On 22nd June the sun will have reached the Tropic of Cancer—his farthest north—on his annual excursion to take summer to the lands north of the equator. The sun moves very slowly when approaching either tropic, and for a few days seems to stay there before commencing to return. This is why the word "Solstice" is used—for this word means "Sun to stand."

Mercury may be seen in the twilight about 6th June, when the planet will be 24 deg. east of the sun. It is a little far north, but in spite of that the planet will not set for one and a-half hours after the sun, and should be quite visible, although the moon is nearing its full. We see Mercury much better here than it is seen in England, where it is often looked for in vain.

Venus is the Evening Star, but it is still low in the twilight, setting about 50 minutes after the sun. Those with a clear western horizon may see Venus and Mercury near each other on 20th June, setting nearly an hour after the sun.

EARTH'S TWIN SISTER.

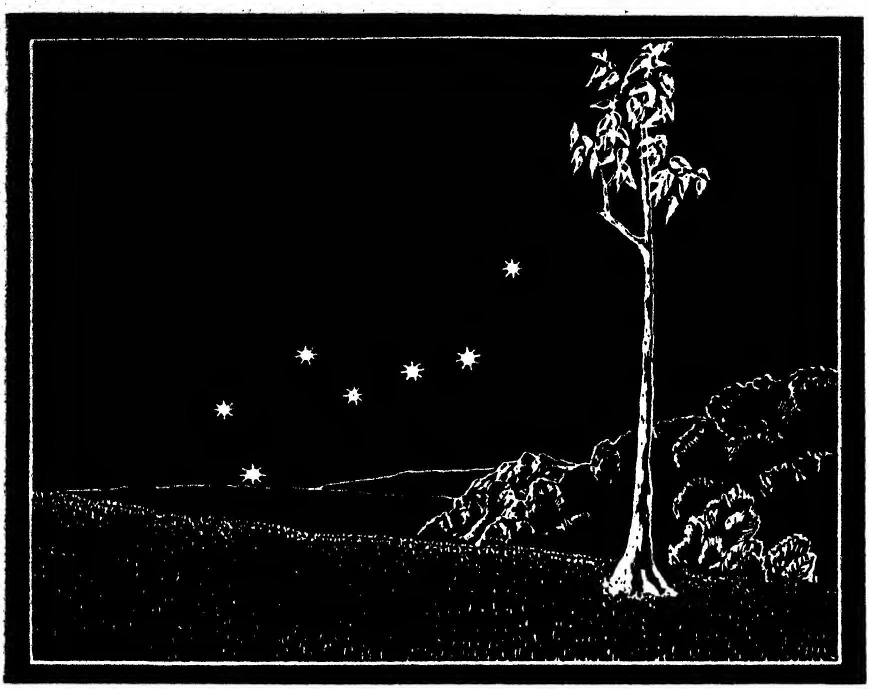
Venus is often called the earth's twin sister, as it is so near the earth in size. The fair planet is 7,600 miles in diameter, while the earth's polar diameter is 7,900. Its density also is but a little lower than that of the earth. It may seem strange that we know so little about the surface conditions of our neighbour, but it is so girt about by dense clouds that we cannot even tell the length of the Cytherian day, or if there are days there. It is thought by some that Venus always keeps one face to the sun as the moon does to the earth.

Mars now rises before midnight, and may be found in the rather dark constellation of Aquarius. When Mars is well up, the Great Square of Pegasus will be seen a little north of it. Also, the moon will be near it on 16th June. On 1st June the Red Planet will be 91,725,000 miles from us—nearer than the sun. It is interesting to watch the slow motion of the planets as they move among the "fixed stars." When the comet appeared near the Scorpion in January, Mars was in that constellation; since then it has moved to its present position, far to the eastward. No wonder planets were once called "Wandering Stars"!

MAREEBA METEORITE.

If one is abroad on almost any clear, moonless night, a few shooting stars or meteors are nearly always seen. Usually they are quite small, or one may light up the landscape, but occasionally a large one may fall to earth, when it is called a meteorite. Such a one was reported to have fallen near Mareeba on the evening of 3rd April. It must have been large and passed near, as the thunder of its descent was such as to shake houses. As sound travels about 12 miles per second, some estimate might have been made of its distance had the time been taken between the appearance and the sound. The solid meteorite would have been very many times smaller than the brilliant envelope of highly heated air which surrounded it and, no doubt, formed a long tail behind. The change of colour from bluish to red may be due to changing temperature, as the velocity of a meteorite is slowed up as it traverses the denser air. Were it found, it would be a most interesting object, not of this world, and from whence no one knows. It would most likely be composed of stone; possibly iron, glazed as if varnished by the melting heat to which it had been subjected by the friction with our atmosphere as it crashed through it. Below the surface it still would have been deadly cold—far below zero—and, if a large one, hoar frost or ice may have formed upon its surface, even though the night was hot at Mareeba.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.



THE GREAT BEAR OF THE NORTH.

In the early evenings of June the Southern Cross stands upright in the sky. It is only at such times that the Cross appears directly above the south point on the horizon. At all other times the Cross is either east or west of south. Whenever the Southern Cross is seen upright it is the best time to face the north and look for the Great Bear, which all those who came from the Old Country know so well. The sight of these seven stars, all of which are visible above the northern horizon a little north of Warwick or Brisbane, brings a thrill and thoughts of long ago to those who spent their childhood in Great Britain. There the Bear is a circumpolar constellation and, therefore, visible on every clear night of the circling year; just as the Southern Cross is a little farther south. Chiefly for that reason it is the most universally known constellation of the north.

THE WAGGON AND HORSES.

To the country folk of Somerset, the Bear is known as the "Waggon and Horses." In other places it is called the "Plough," the "Wain," or the "Waggon." In America it is known as the "Dipper." In early times it seems to have been called a "Chariot." However, it was known as the Great Bear from the remotest ages. In ancient Greece the Bear was spoken of, and still earlier in Babylonia. Aratus, in the second century B.C., said of the celestial pole: "Two Bears called Wains move round it, either in her place."

It requires a great stretch of the imagination to see a Bear in this constellation, although there are a great many more stars in it than the seven bright ones. According to the old star maps, the curve of stars represents the Bear's tail. Bears have no tails to-day; perhaps they had when this one was young!

At Warwick, with a clear northern horizon, most of the seven stars can be seen, but the lowest star, Dubhe, never rises above the horizon. At Brisbane Dubhe rises just above the horizon, but is still too low to be seen. People from the Old Country are surprised that we see "Their" Great Bear so far south. It may surprise them more to know that all "Their" star-groups appear upside down here. The Bear is a large constellation, and the great curve of five bright stars are conspicuous for the few hours while they are above the horizon at Brisbane; the farther north one goes the higher the Bear appears in the sky.

POINTERS TO THE NORTH STAR.

The two stars to the left of the picture—the most westerly—are Alpha or Dubhe, which means "the Bear," near the horizon, and Beta or Merak. These two are the famous pointers to Polaris—the North Star—which is, of course, always far below the horizon of Australia.

Of late years, since astronomers have been able to calculate the proper motions of some of the stars, it has been found that usually the direction and velocity of stars in the same group are so different that it may be seen at once that they are not related. In the Great Bear, however, the velocity and direction of its members are very similar indeed—all moving like a flock of birds, excepting Alpha, the star near the horizon, and Eta, the star at the end of the tail. These two stars are moving in a direction almost opposite to the others, which shows that they are not related to the other members of the group.

An interesting star is Mizar, the second star from the end of the tail. When the Bear is high enough to be well seen, it is a naked-eye double; the small companion star is called Alcor. With a telescope, Mizar itself is found to be double, and the spectroscope shows that one of the components is also double. Therefore, Mizar is really a multiple star system, although appearing as a single star to us.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1941 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of years' records	Mar., 1941.	Mar., 1940.
North Coast.	In.		In.	In.
Atherton	9·11	40	14·95	20·36
Cairns	18·37	59	17·39	41·19
Cardwell	15·84	69	22·26	22·42
Cooktown	15·47	65	13·28	25·89
Herberton	7·97	55	12·11	13·70
Ingham	16·30	49	13·28	25·62
Innisfail	26·99	60	35·06	44·06
Mossman Mill	18·90	28	23·80	38·97
Townsville	5·71	24	15·82	5·51
Central Coast.				
Ayr	6·31	54	14·07	3·13
Bowen	5·76	70	8·99	4·34
Charters Towers	3·75	59	4·16	3·80
Mackay P.O.	12·27	70	14·83	16·46
Mackay Sugar Experiment Station	11·33	44	9·16	14·94
Proserpine	12·48	38	10·52	12·65
St. Lawrence	4·24	70	10·32	15·55
South Coast.				
Biggenden	4·04	42	5·09	6·17
Bundaberg	5·33	58	8·77	7·35
Brisbane	5·79	89	5·52	8·72
Caboolture	7·93	65	6·56	9·71
Childers	4·91	46	6·09	8·23
Crohamhurst	11·28	48	11·84	17·13
Esk	4·73	54	6·35	5·36
South Coast—contd.	In.		In.	In.
Gatton College	3·29	42	5·64	4·26
Gayndah	3·04	70	7·00	4·32
Gympie	6·21	71	6·42	6·81
Kilkivan	3·95	60	3·61	5·26
Maryborough	5·99	70	4·48	8·88
Nambour	9·58	45	8·98	11·74
Nanango	3·37	59	5·48	4·68
Rockhampton	4·50	70	5·97	5·68
Woodford	7·84	54	10·07	10·38
Central Highlands.				
Clermont	3·09	70	11·40	5·41
Gindie	2·66	42	7·43	4·96
Springsure	2·96	72	4·19	4·77
Darling Downs.				
Dalby	2·73	71	4·92	3·25
Emu Vale	2·40	45	3·57	3·18
Hermitage	2·26	35	..	3·19
Jimbour	2·41	62	4·44	3·32
Miles	2·71	56	5·51	3·73
Stanthorpe	2·62	68	1·79	2·57
Toowoomba	3·78	69	5·02	4·44
Warwick	2·58	76	2·88	3·60
Maranoa.				
Bungeworgoral	1·85	27	..	2·72
Roma	2·68	67	7·71	3·04

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MARCH, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature. Means.		Shade Temperature. Extremes.				Rainfall.	
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points	
Cooktown	..	87	77	95	13	73	31	1,328	22
Herberton	..	80	66	85	16	59	4	1,211	19
Rockhampton	29·94	87	71	96	6	59	24	597	14
Brisbane	29·99	81	67	92	5	58	24	552	15
Darling Downs.									
Dalby	..	82	62	92	4, 5	47	24	491	13
Stanthorpe	..	76	56	87	4	36	24	179	9
Toowoomba	..	75	60	85	5	50	23, 24	502	12
Mid-Interior.									
Georgetown	29·86	92	73	98	1, 2	68	23	1,040	14
Longreach	29·91	90	68	99	6, 12	55	23	778	14
Mitchell	29·95	84	63	92	4	47	24	576	11
Western.									
Burketown	..	89	76	97	15	73	22,23,24	684	17
Boulia	29·91	90	70	107	2	62	23	946	12
Thargomindah	29·94	84	65	93	17, 18	55	23	356	5

ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling**, members of Agricultural Societies, **Five Shillings**, including postage. General Public, **Ten Shillings**, including postage.

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Agriculture in National Economy.

WHAT Napoleon said about an army marching on its stomach is more than a figure of speech; it is an accepted military maxim. It is also true that a modern army moves on wheels, for which rubber is a necessity. It is true, too, that motor spirit derived from vegetable substances—power alcohol from sugar-cane, for instance—is growing in military importance. Other raw materials, in infinite number and variety, are indispensable in making the equipment for our fighting forces. The farming industry is called upon, not only to supply many of these raw materials, but also to feed the millions of people in the cities who turn them into fighting weapons. Agriculture's part, then, in the whole business is of vital importance in national defence—and so it can be said again without any extravagant use of language that the farms of the nation are in the front line of freedom.

Planned Agriculture.

THERE is plenty of evidence these days of the gathering strength of the movement towards the stabilisation of our primary industries, by which the whole Commonwealth is bound to benefit. There are two fundamental principles: the first is to see that we are always in a position to send as much food as the Old Country can take from us; and the second is to keep our land industries up to a high standard of efficiency throughout the period of the war, so that when victory comes

we shall be able to increase production in double-quick time. Nothing is more certain that the biggest and most urgent need of the world after the war will be food. Our place in the whole economic life of the British Commonwealth makes the maintenance of all forms of primary production here an absolute essential; and, among other things, our job now is to test out more and more of the crops that up till now we have not thought much about and which we know we can grow without very much trouble.

So far as the primary producer is concerned, all he wants is a market and a fair price for his products; he can be depended upon to do the rest.

Post-War Reconstruction.

WE shall all have to make some contribution—that is, a worth-while contribution—to a well-thought-out policy of post-war rebuilding. We shall not get very far by merely talking about these things, and the days of highfalutin nebulosities are over for all of us. For our own survival and security we are now fighting and working, and those of us who are out of the actual fighting line are well and truly in the working line, and now, in Churchill's inspiring words, it's a case of "each to the task . . . . and to the toil." Pretty schemes are all right, but the thing is to see whatever schemes that are adopted, whether they are pretty or not, are workable and, if so, to get them into full working order without any delay. In all our planning we have to keep things in the proper perspective and look at facts in their proper proportions.

Farmers are thinking hard along these lines, and here is what a well-known practical producer said recently:—

> "It seems to me that the time is ripe for the setting up of advisory councils, consisting wholly of successful farmers, to plan ahead in co-operation with the Department of Agriculture for the production of the things we used to import, but which can be grown successfully here. In this way we can save exchange and provide new avenues in readiness for the time when many men of the fighting forces will return to us and want to settle on the land."

Such councils would, of course, have to be selected on a district basis. At all costs, we should avoid the mistakes made after the last war. As these councils would be made up of practical men willing to serve, no doubt voluntarily, with ample knowledge of the capacity of their districts to grow different kinds of crops, they would be in a position to save a good deal of time in any local trials and get results quickly.

Much the same idea was also expressed about the same time by a well-known Downs wheatgrower and grazier. "It is up to us," he said, "to see provision is made against any repetition of some of the conditions that arose after the last war. Organisation for this purpose should start now and not when our lads return. There are many capable men in the agricultural industry and in our Government departments able to lay out the foundations of schemes to absorb these young men when they come back. With the assistance of men in industries suitable for this purpose, much useful and necessary preparation could be started and started now . . . . Provision should be made to give every facility for the men returning to have an assured chance of re-establishing themselves in civil life in suitable occupations. It is our duty to see we don't fall down on the job."

Trees on the Farm for Shelter, Windbreaks, and Beauty.

NOW is the time for us to think about putting in a few trees around the place and out in the paddocks, especially in open country in the colder parts of the State. For shelter for stock and as windbreaks, trees have a definite economic value on a farm. The same may be said of trees planted for purely garden or landscape effects, for they too, add value to a property, besides suggesting comfort and cosiness in a farm homestead, which bare, bleak surroundings will never suggest, no matter how fertile or well-cropped a farm may be.

It has been said of Australians, at least of many of us, that we were born with a "Black Kelly," a "Collie King," or a "Plumb" axe in our hands, and there is often very solid ground for the taunt, for many of us have never realised what a heritage we have in our native trees.

As for judicious tree planting on farms on the open downs country, or on farms that have been cleared of every bit of timber, there is really no excuse for our neglect to make our homes real farm homes with the right species of trees providing shelter and shade, for in Queensland we have an excellent tree service. The Government Botanist is ready to advise on tree planting in any particular district, the kind of trees to put in, whether for shade or as a fodder standby, at any time. The Sub-Department of Forestry in the Department of Public Lands can supply many species of trees at a very low price, in tubes ready to plant.

Sheep men in our western open rolling downs country have a full appreciation of the value of trees, and the man who uses an axe out there without thought or judgment usually gets short shrift.

Our Tree Heritage.

FORTUNATELY, we are all acquiring a real forest consciousness, and are coming to regard our native trees as a noble heritage, and where clearing or ringbarking has to be done we are using more forethought and judgment. Let us hope that no longer will our forest wealth be regarded as a vanishing asset.

No town or landscape is complete without trees, and a treeless stretch of country is often drab and uninteresting. The chief point in tree planting is to place the trees to the best advantage, choosing, of course, species best suited for the purpose and locality. Nature has generously provided us with trees that will stand up to strong winds, others for shade and avenue purposes, and others again that provide not only shade for stock but food, too, when the time of necessity arrives. Then there are the lemon-scented gums and the blue gums—who of us can forget a sightline of blue gums in his memories of our countryside!

There is a certain country town where the summers are sizzling, but where belts and avenues of white cedars have made all the difference to the people who live there. Look what could be done in every country centre with a properly ordered scheme of tree planting—trees suitable to the locality, and which would add beauty to every street, and so stimulate commendable civic pride.

Starting the Orchard.

By Officers of the Fruit Branch.

SELECTION OF THE SITE FOR AN ORCHARD.

THE successful production of fruit depends, firstly, on the right kinds of fruit being grown in the right soil and climate. Other points to be considered are the selection of a site for the orchard, the aspect, drainage, fertility, and accessibility.

The ideal site would be one that is well sheltered on all sides from heavy winds, but particularly those from the west and south. If the site is a sloping one, it should, for preference, be in a northerly or easterly direction. In districts where frosts are prevalent and the crop is one subject to injury, high-lying land should be chosen and care taken to see that windbreaks are present on the westerly and southerly sides. When leaving windbreaks of timber, it is important, particularly on coastal scrub lands, that these should be of at least 2-chain widths. Strips of timber of lesser width rapidly die out, leaving the orchard exposed.

Good natural drainage is most essential, and in its absence no other soil treatment can counteract the deficiency. Adventitious draining by means of agricultural pipes, stones, slabs, &c., can effect some improvement to badly drained soils, but cannot be economically applied to large orchards, and at best will not equal natural drainage. Those soils which possess a compact subsoil close to the surface through which the water cannot permeate should always be avoided.

Though fertile soils have an advantage over poorer soils in that it is easier to maintain fertility than to build it up, it is possible within certain limits to make up the deficiency in plant foods by the application of artificial fertilizers and by the ploughing-in of cover crops.

Accessibility may be considered from two aspects—firstly, the ease with which the site can be worked, remembering that level or nearly level situations are easier and less costly to work; and secondly, the facilities available for smooth and quick transport of the fruit to market. A good road to a convenient point of despatch to market is desirable.

PREPARATION OF THE LAND.

In preparing the land stumps and roots should be run to a depth of not less than 12 inches, and preferably up to 18 inches, so that subsoiling can be effectively carried out if required. It is far better to delay planting for a season and have the land thoroughly worked up than to plant in soils which have not been properly prepared. After the first ploughing to a depth of about 3 inches the land should be left in the rough state to destroy weed growths. Two or three weeks later the land may be cross-ploughed deeper, and harrowed, followed by a third and still deeper ploughing. Subsequently, harrowing will reduce the soil to a tilth and collect coarse weed growth, small roots, and other rubbish. In most cases it is not advisable to bring the soil beyond a depth of nine to ten inches to the surface.

Subsoiling.

Where subsoiling is practised (the deeper this is done the better), the subsoil is merely broken up without being brought to the surface. Briefly, the advantages of subsoiling are that the capacity of the soil for the retention of moisture during dry spells is increased, and that the subsoil is made more permeable to the roots, which then have a tendency to go down instead of remaining on the surface. Surface roots are undesirable, particularly in those districts experiencing a wide range of temperature.

Subsoiling may be carried out by following in the plough furrows with a strong second plough to which is attached a strong bull-tongue share. Where the subsoil is compact considerable power is required to break it up to any depth, and a tractor is often brought into use for this work. Where the land has not been cleared to a sufficient depth to permit of the use of a subsoiling plough, explosives may be used, though they are fairly costly and require extreme care in handling. The soil requires to be in a "dry" condition. Holes to a depth of about 2 ft. 6 in. should be bored with a soil augur or "jumped" with a bar. Into each is lowered a ¾-inch plug of gelignite with fuse and cap attached, and several inches of fuse allowed to protrude from the hole. The holes should be filled with dry soil or sand, no tamping being necessary, and the fuse lighted. The shattering effect of a ¾-inch plug of gelignite is approximately seven to eight feet laterally. The lighter the soil the less is the resistance, and consequent reduction in the area of shock. Grown trees in the orchard may be subsoiled in this way without damaging them in the least.

LAYING OUT THE ORCHARD.

For laying out the orchard a supply of short stakes about 18 inches to 2 feet long is necessary to mark the positions of the trees. Planting is principally carried out on the square or the septuple system, though the former system is preferred in that it provides for easier cultivation and offers greater facilities for interculture. With the septuple system 15 per cent. more trees are planted per acre.

The Planting Wire.

No matter which system is adopted, a planting wire will be of great assistance. It may be of any desired length up to 500 feet; No. 10 or No. 12 gauge soft wire makes a good article for the purpose. Fasten a 3 or 4-inch round ring at one end, drive a stake through this, and stretch the wire straight and taut along the ground, fastening it to a second stake at the other end. Next measure the wire carefully, starting at the end with the ring on, and place marks at the distances the trees are to be planted apart. If for instance, the trees are to be planted 20 feet apart, mark the wire every 20 feet. A piece of fine tie-wire wound round the planting wire and soldered makes a permanent mark which will not shift. When the required number of marks has been put on, fasten another ring at the last 20-feet mark.

Planting in Squares.

When laying out the orchard with the planting wire select the longest side as the base line and stretch the planting-wire along it, driving in stakes at each mark on the wire and at both ends. Next stretch the wire along one side at right angles to the base line, and again drive in stakes at each mark on the wire.

To Make a Right Angle.

The following method of laying out a right angle is based on the fact that a triangle with the sides in the proportion of 3, 4, and 5 is always a right-angled triangle. Referring to Plate 91, AB is the base line, and it is desired to lay off a line AD at right angles. Place a small peg in the ground at A, and with a tape measure mark off 90 links along the base line to the point B. Insert another peg at the 30-link mark C. Now bring the 90-link mark on the tape to the point C and fasten it there. Next pick up the tape at the 40-link mark, and walk backwards until the tape tightens equally from both ends, and insert another peg at this spot, which is D. A line drawn then from A to D is exactly at right-angles with the base line AB.

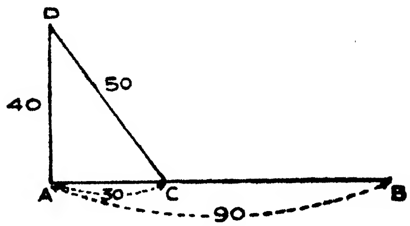


Plate 91.

To Make a Right Angle.

Having staked one side at right-angles to the base line, run a right-angle from the other end of the base line and stake as before. Next stretch the wire along the fourth side of the rectangle, and stake in a similar manner. To mark the positions of the trees in the rectangle is then only a matter of stretching the wire across the rectangle from peg to peg parallel with the base line and hammering in stakes at each mark on the wire.

Planting on the Septuple System.

Lay-off and stake the base line as described above. Set-off the two side lines also as described, but instead of placing the stakes on the side lines at the same distance as they are on the base line, they should be only ·866 of the distance, so that if the stakes on the base line are 20 feet apart, the pegs on the side lines will be as nearly as possible 17 feet 4 inches. Next place a mark 10 feet from one end of the planting-wire and stretch it across between the stakes on the side lines and parallel to the base line.

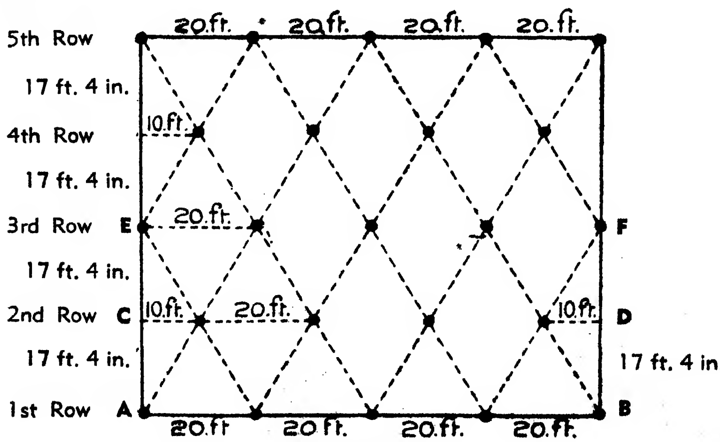


Plate 92.

Planting on the Septuple System.

The base row has already been staked 20 feet apart; on the second row, CD, bring the 10 feet mark on the planting-wire to the point C; this will then bring each mark on the wire midway between the stakes on the base line, and stake. For the third row stretch the wire full length between E and F, with the end of the wire at E; the marks on the wire will then correspond with those on the base line. For the fourth row carry on as in the case of the second row, and so on.

PLANTING THE TREES.

If the trees are worked trees, the buds or grafts should have made close unions with the stocks. There should be no dead wood at the point of union, and the scions should have been trained in such a manner that they are straight, clean, and well-grown. The root systems should contain sound, fibrous roots, and all straggling roots should be cut off clean. Trees one year old from the bud or graft are to be preferred as they quickly recover from the shock of transplanting, and medium-sized trees are better than unduly large ones.

Planting Board.

To ensure that the young trees are placed in the exact spot occupied by the stakes, a planting board will be found useful and can be easily made. A piece of board about 5 feet long by 6 inches wide by 1 inch thick is a handy size. In the middle of one side cut out a "V" piece as shown at A. On the other side cut out pieces about 1 inch square from the corners as shown at B and C. When using, the stake which

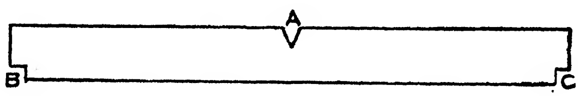


Plate 93.
PLANTING BOARD.

marks the spot where the tree is to be planted should be fitted into the "V." Two more stakes should then be driven firmly in to the ground at B and C. The board and the original peg A may then be removed, leaving the pegs at B and C; and the hole can be dug. When planting, the board should be replaced with the two pegs again fitting into the shoulders at B and C; the tree is placed in the "V" and the soil filled in.

The planting-board serves another purpose in that it ensures planting the trees at the proper depth. The correct depth at which to plant is usually the depth at which the trees were grown in the nursery; the mark can generally be distinguished on the tree. The union of the stock and scion is always a weak spot in a tree and liable to attack from fungus diseases; it should therefore be kept above the level of the soil. When using the planting-board the union, if kept level with the top of the board, will prevent the tree being planted too deeply.

In digging the holes for the trees, the surface soil should be taken out and placed on one side. The subsoil at the bottom of the holes should be broken up finely. Provided the orchard has been properly prepared there is no need to dig big holes. So long as they are large enough and deep enough to space the roots without cramping they will serve the purpose.

The roots should be spread out and spaced as evenly as possible with a downward slope of 40 to 45 degrees (Plate 94; fig. 1), the spaces being filled in with fine top soil and pressed firmly. Water should be applied before the hole is completely refilled and allowed to soak well in before the refilling is completed. Care should be exercised at all times when planting not to expose the roots to sun and dry air. Keep the trees covered with damp sacking until ready to plant.

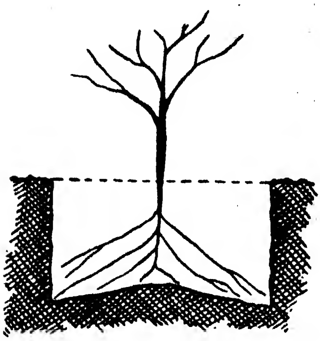


Fig 1.—The right way.

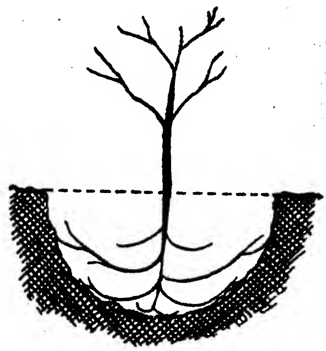


Fig. 2.—The wrong way.

Plate 94.
TREE PLANTING.

Time of Planting.

The season of planting varies according to the variety, location, and local circumstances, and will be dealt with in detail when describing individual fruits.

WATER MOUSE TRAP.

Here is a sketch of a device which was successfully used during former mouse plagues. The construction is easy. The requirements are a kerosene tin, a few cotton reels, a piece of stout fencing wire, a section of board two or three inches wide and sufficiently long to provide a runaway for the mice leading from the ground to the top of the trap, a small piece of thin wire, and some bait such as a lump of bread or cheese.

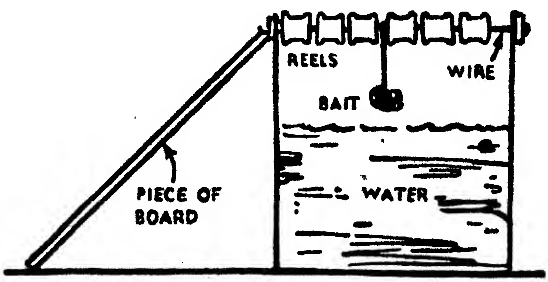


Plate 95.

Holes are punched through two opposite sides of the tin near to the top. The fencing wire is then passed through one of the holes, and threaded through half-a-dozen of the cotton reels, and out of the tin at the other side. The board is placed against one side of the tin, giving the mice access to the reel bridge. The mice, in attempting to get at the bait, slide into the water below. A little grease on the fencing wire will cause the reels to revolve more readily.

Propagation of Fruit Trees.

By Officers of the Fruit Branch.

THOUGH a few varieties of fruit trees perpetuate their characteristics when raised from seeds, the majority cannot be relied upon to produce fruit of any required type; so, with practically all commercial sorts, adventitious means of propagation—budding, grafting, inarching, goatee, marcottage layering, growing from cuttings, or off shoots—are adopted.

Budding and grafting are the two chief operations practised in this State, and with hard wooded trees budding has almost entirely supplanted grafting excepting in the case of some deciduous types, and also in top-working trees of this nature, upon which strap grafting is successfully applied in the Stanthorpe district. By means of these operations the exact counterpart of a parent tree and its fruit may be perpetuated indefinitely and economically with a minimum of time and labour.

THE SELECTION OF THE STOCK.

The first consideration, where either budding or grafting is resorted to, is analogy between stock and scion, not only as regards cell formation, but also in respect to size and general development. Should the stock possess an excess of vigour over and above that normally required by the scion, the result would probably mean excessive growth of the top and ultimately premature decay of the tree. On the other hand, should the stock be lacking in vigour the union would result in the stunted growth of the tree.

The selection of the stock is, therefore, confined to narrow limits and knowledge as to the most suitable for different soils or locations can only be determined by experience. No particular stock can be said to be universally adaptable.

THE SELECTION OF THE SCION.

In selecting the scion only the best of wood should be taken from vigorous, healthy trees of proved fruiting qualities. Scions for grafting should be properly matured, and selected from the trees whilst dormant, and buried in damp soil until required in the early spring.

Wood for budding evergreen trees should also be selected whilst dormant, and if the leaves of selected wood are severed at about half the length of the petiole or leaf stalk two or three weeks before removing from the tree, the buds will tend to swell and to start into growth more quickly after budding. In the case of deciduous trees, wood may be selected whilst the trees are in growth. Deciduous trees, but more particularly apples and pears, are best if well shortened the previous year so that good, sound, young wood, practically free from flower buds, may be produced specially for the purpose, wood of one year's growth being used, the terminals in all cases being discarded.

In the case of most evergreens, notably citrus, the last growths are invariably rejected. The junction of the last growth and that preceding it is readily discernible, being indicated by what is generally referred to as a joint (Plate 97).

Propagation by Seed.

To produce vigorous plants it is essential to see that the seeds have properly matured, and they have been properly stored until required for sowing, and that they are sown at the right time and in a manner conducive to germination. If seeds are well kept and sown in the spring, they will germinate strongly and the young plants progress as conditions become more favourable to their growth.

Where fruit tree stocks are raised from seed, the seed should be taken only from selected fruits from vigorous trees grown under conditions favourable to their normal development.

Seeds from evergreen trees seldom retain unimpaired vitality over a lengthy period, consequently they are usually sown soon after removal from the fruit. Those with a glutinous adherence should be well washed and placed in thin layers in the shade to dry prior to sowing.

Seed from stone and pip fruits should be obtained as fresh from the fruit as possible, and should not be allowed to dry out, but should be kept in slightly damp sand or soil until showing indications of breaking into growth.

Peach and other prunus seeds may be kept in a similar manner to pip fruits, but, as they are usually large enough to bud during the summer growth following their sowing, it is preferable to plant them out straight away in nursery rows at a depth of not more than 3 inches, to germinate when conditions are favourable.

Apples, pears, oranges, nuts, persimmons, and generally custard apples, are preferably raised in seed-beds under light shade and planted out into nursery rows prior to the second year's growth.

SEED-BED PRACTICE.

Seed-beds should be of a light, friable, loamy nature, well drained, and preferably not over fertile. Such a soil will tend to good root development by the young plants. Facilities for shading are necessary, and should be made available. Friability of the soil is an essential feature, and is not always a natural condition, particularly in heavy soils, which are invariably inclined to form a crust on the surface to the detriment of the young plants. The addition of sufficient leaf mould or decomposed organic matter and sand will largely effect the necessary alteration, but as these are not always to be had in sufficient quantity a generous application of freshly slaked lime, at the rate of 4 to 5 lb. per square yard, thoroughly incorporated with the surface soil some months before sowing, will greatly assist in bringing about a fine tilth.

The addition of large quantities of stable manure is not advisable since this is often the cause of young seedlings suddenly wilting and dying off owing to attack by a fungus disease at ground level.

Shade is an important feature when starting nearly all seeds, but more particularly when it is desired to raise plants early in the season

or what is considered out of season. Whatever shade is used need not be of a permanent nature, but the closer the covering is to the ground, allowing, of course, room for watering, the less evaporation there will be from the beds, and the more even will be the moisture maintained. This latter condition is particularly desirable. A fabric covering is preferable to one of brush or small boughs, as, after the seed has germinated, it can more readily be removed to allow the young plants the benefit of the early morning sun, the time of exposure being gradually increased until, when the plants are large enough, the covering can be entirely disposed of.

TRANSPLANTING INTO NURSERY ROWS.

Transplanting should be done only whilst the plants are dormant. After removal from the seed-bed, all badly grown and weakly plants and those with twisted or contorted main roots should be rejected. Tap roots should be shortened to within 8 inches, and other roots trimmed if required to a reasonable distance. In the case of evergreen plants, the head should also be cut back, the leaves being severed at about half their length.

Plate 96.

The usual practice in planting out in nursery rows is to open up narrow trenches about 3 feet apart and only deep enough to receive the young plants. The young trees are placed in position singly about 6 to 10 inches apart, and fine soil distributed amongst the roots and pressed down firmly, leaving about 2 inches of the top of the trench open to receive water, which, if the soil is at all dry, should be applied as soon as possible after planting, and allowed to soak completely into the ground before the remaining soil is replaced. Watering at planting is generally practised in the case of all plants, though with evergreens it is much more essential than with deciduous types. On no account should the roots be allowed to become dry as they are extremely sensitive. They should at all times during transplanting be kept covered with some moist material.

BUDDING.

To perform the operation first see that only fully-developed mature buds are selected Plate 96 shows the branch of a peach tree of the season's growth. The buds at the top end are not sufficiently mature, and the buds at the base are flat and more or less blind, and therefore uncertain, but the buds in the middle are well developed and fit for

Plate 97.

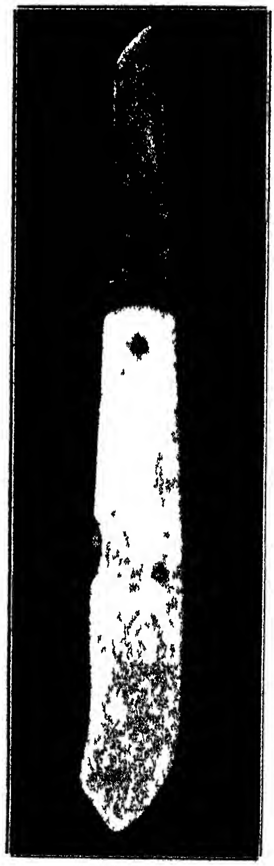


Plate 98.

working. This is termed a bud stick. In the case of stone fruits, there are frequently three buds together, one central bud somewhat pointed, and the two side buds are fruit buds. Good single buds, plump and full, are always to be preferred, but when not obtainable triple buds can be used.

Plate 97 shows a branch of a citrus tree comprising two periods of growth. The joint is plainly seen, indicating where the previous growth terminated and the last growth commenced. The last growth is discarded as the buds are somewhat immature, whilst those at the base of the previous growth are flat and likely to be blind, and therefore unsuitable. Those in the middle are full and well developed and ready to use.

Plate 98 illustrates a good type of budding knife. The handle is of bone and tapered somewhat to a blunt point at the end, and is often useful in aiding the insertion of an obstinate bud.

Plate 99

Plate 99 shows the method of holding the bud stick and of cuttin the bud from the base in the case of citrus fruits; but for stone and pi fruits the buds should be cut from the top. The budding knife shoul be kept very keen, and the bud should be severed with one straigh clean drawing cut. It should be cut very fine with as little wood a possible, and if this is done there is no need to remove any of the wood though it is recognised that a bud with the wood taken out will star into growth more quickly than one with the wood left in. When it i intended to remove the wood the bud should be cut a little longer, an if one end of the bark is turned back slightly the wood will usuall protrude and may be pulled out easily without injuring the bud. I the case of citrus, it is not always possible to remove the wood on accoun of the presence of wood thorns.

Plate 100; fig. 1 illustrates a well-developed bud cut and ready for insertion.

Plate 100; fig. 2 shows the method of making the T-shaped cut in the stock. The vertical cut is made first, the cut being made clean through the bark without injuring the wood underneath. The cross cut is made from left to right, the knife being held at an angle to the stock, and the cut made with a twist that will open the bark sufficiently to permit of the insertion of the bud without quilling. The bud is held between the thumb and forefinger of the left hand and inserted under the bark at the top of

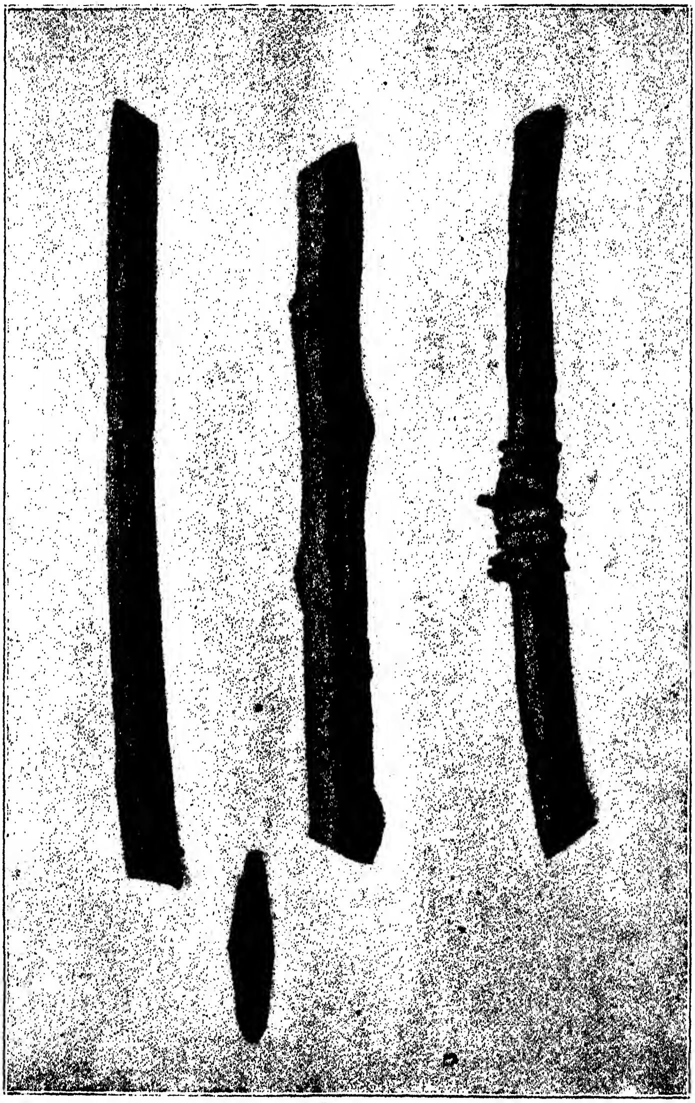


Fig 2. Fig. 1. Fig. 3. Fig. 4.

Plate 100.

the cut and gently pressed down with the thumb, when, if the bark is lifting freely, it will enter easily. The bud should be pushed down until the top end is level with the cross cut.

Plate 100; fig. 3 shows the bud in position.

Plate 100; fig. 4 shows the method of tying. It is preferable to commence at the bottom of the cut and work up, as in this way the tendency is for any air in the wound to be squeezed out at the top and the bark will also be brought back closer to its original position. Tying should always be carefully done, a moderate pressure being maintained throughout. Various materials can be used for tying, of which narrow strips of thin calico, cotton wick, twine, waxed tape, and raffia are common. Three-ply seaming twine answers well for varieties which are slow to strike, whilst raffia serves for those which are quick to vegetate. Two or three weeks after the buds have been inserted they should be examined, and if they have taken, then the ties should be cut but not removed. If they are not cut they will injure the growth of the stock. When the buds have missed, the stocks should be rebudded on the opposite side. When the budding has been done in the autumn it is better to leave the trees as they are until the following spring, but if it has been done in the spring they may be made to start into growth at once by removing a portion of the top of the stock sufficient to cause the bud to start, or the stock may be cut half-way through a few inches above the bud on the reverse side and split up the middle and laid over on the ground above the bud. In the case of the bud which has remained dormant during the winter, early in spring before growth starts, the whole of the stock should be removed a few inches above the bud, which will then start into life and can be trained to grow upright by tying it to the portion of stock left for this purpose. This is shown in Plate 101. When the bud is strong enough to support itself the stock may be cut clean away with a sloping cut just above the bud as shown by line (*a*) in Plate 101. This cut should always be carefully and cleanly made, as the wound will then heal rapidly and the union will be practically a perfect one, whereas if the cut is carelessly made it is always a weak spot, and the tree is liable to be broken off by a heavy wind. It is advisable to stake all young trees if the nursery is at all exposed to winds, otherwise twisted trunks will result in many cases.

Plate 101.

Besides stone and citrus fruits most other varieties can be propagated by budding, the process being very similar in every respect, with the exception that the buds are rather differently cut.

Apple and pear buds are usually cut rather longer and fuller than peach buds, but the operation is otherwise the same.

With figs, walnuts, chestnuts, and other soft-wooded trees budding is much more difficult, as, though the method is practically the same, the buds require to be cut much larger and should have the greater part of their wood removed. The whole operation requires to be rapidly done, especially in the case of trees possessing a milky sap, as, if exposed to the air for any length of time, the sap sours and the union will not take place. Waxed ties are best for such varieties, as they keep the wound practically airtight.

Plate-budding or Patch-budding.

In addition to T-budding, there are several other methods of budding, such as plate-budding, ring-budding, whistle-budding, and twig-budding, each of value for particular varieties of fruits; but for the average fruitgrower a thorough knowledge of T-budding is all that is necessary as a general rule. There is, however, one form of budding—viz., plate-budding or patch-budding (Plate 102)—that is particularly adapted to the working over of seedling mangoes with the best varieties of this fruit. This method is as described below.

Remove a piece of bark about 2 inches long by 1 inch wide or larger from a branch of the tree producing the variety it is desired to propagate, selecting a portion of the branch containing a ring of dormant buds, which always occurs at the periodical terminal growths. The bark of both budwood and stocks should be of grey colour to ensure best results, though the thickness of the bark is immaterial. The bark must be removed as carefully as possible from the bud stick and should be, if anything, rather thicker than the bark on the tree to be worked over. If the bark is running freely it is an easy matter to secure the buds, but if not, then any wood that may be attached to the bark containing the dormant buds must be carefully cut away.

The stock is prepared by removing a piece of bark of the same size as that containing the dormant buds. The latter should fit on to the stem or branch of the tree to be worked over as evenly as possible, as the inner barks of the stock and scion must be brought close together, otherwise there will be no union. Once the bud is placed in position, it should be firmly tied in place, and then waxed. No air must be allowed to gain access between the scion and the stock. If the operation is carefully carried out, a union soon takes place; and as soon as this occurs the stock should be girdled just above the bud, thus tending to force the sap into the scion and start the dormant buds. The subsequent treatment is very simple, and consists of cutting off the stock just above the bud and allowing the shoot or shoots coming from the bud to form the future branch or head of the tree. A number of plate-buds can be placed on different branches of a bearing tree, or one or two buds can be inserted into a young seedling, and the head of the tree formed from the growth arising from these buds. The bark of the stock should always run very freely, much more so than that of the scion, as no union will take place readily unless the stock is in a vigorous state of growth.

GRAFTING.

The object of grafting is similar to that of budding—viz., to propagate any given variety of fruit true to kind, or to convert unsuitable or unprofitable varieties to suitable or profitable ones. The operation, however, differs from budding in that with budding a single bud only is taken, whereas, with grafting, a scion containing a number of buds is

used. Further, whereas budding can only be successfully performed whilst the stock is in a state of active growth, the season of grafting, with the exception of bark or rind grafting, is mainly confined to the early spring, just before or about the time of the bursting of the buds and the commencement of active growth. The principle of every method of grafting is the bringing together of the cambium layers, or growing tissues, under the bark of both stock and scion.

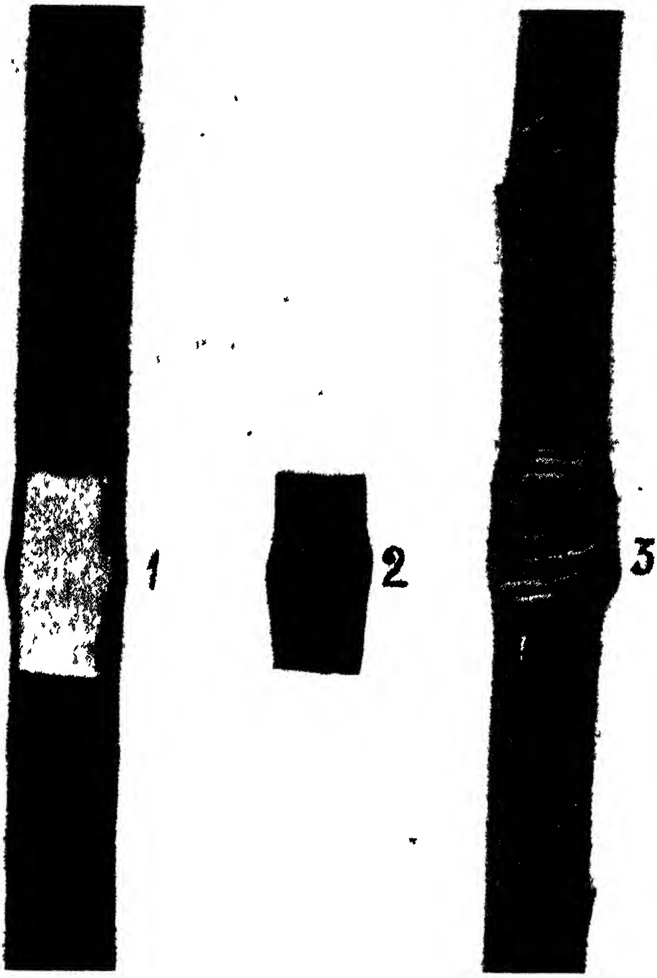


Plate 102.

PLATE-BUDDING OR PATCH-BUDDING.—(1) Section showing bud with patch removed; (2) bud with patch as removed; (3) bud with patch placed and tied on stock, a patch of bark exactly similar in size having been first removed from the latter.

Grafting is applicable to fruit trees of all kinds and sizes from nursery stock to large trees, various methods being adopted according to varieties, though the whip-tongue graft has preference. When citrus trees are grafted, which is rarely (budding being preferred) rind-grafting is preferable, whilst with custard apples the side cleft, as applicable to herbaceous plants, is used.

After grafting at or near ground level it is customary to bank the soil, which should be in a damp condition, from both sides of the row to the top of the scion, pressing it down firmly, and placing a little loose soil or mulch covering over all. When this is done there is no occasion for the use of wax or cotton ligatures—as previously stated, three-ply seaming twine answers for varieties which are slow to take, whilst raffia serves for those which are quick to make a union.

The tools required for grafting consist of the following:—

(1) A strong pruning knife, having either a straight or curved blade, according to taste, with which to prepare the stock.

(2) A knife having a thin straight blade with which to prepare the scion; a strong budding knife answers well.

(3) A good pruning saw.

(4) A strong chisel and wooden mallet for preparing large stocks.

(5) Grafting wax.

(6) Materials for tying grafts, such as raffia, waxed cloth, twine, or cotton wick, &c.

Grafting Wax and Tape.

The best material for making waxed cloth is a cheap calico that tears easily. It should be washed before waxing.

The cloth may be made up according to either of the following two formulas:—

First Method.—The cloth is first prepared by tearing it into strips 9 inches wide and winding tightly around stout iron wire or upon sticks until the roll is not more than 2 inches in diameter.

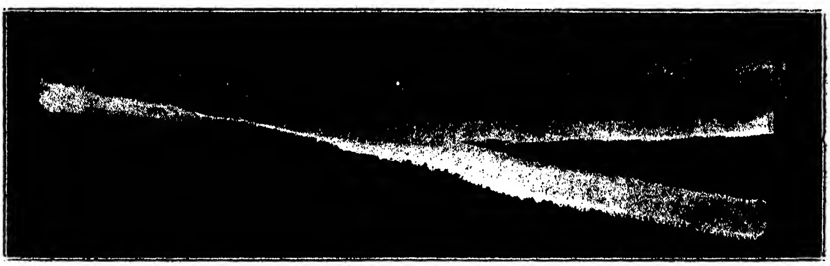


Plate 103.

If the rolls are of greater diameter the wax penetrates with difficulty to the innermost layers of cloth. In order to prevent the cloth from unwinding, tie a string around each end of the rolls. If the cloth is wound upon wire the weight of the wire will sink the rolls in the mixture; if upon wood, the rolls should be kept submerged until the cloth is saturated with wax. Place 1 lb. beeswax and 1 lb. powdered resin in an iron pot and melt over a slow fire. Put the rolls of cloth in the melted wax for about fifteen minutes. Do not permit the mixture to boil or the cloth may be burned. When cold it is ready to use. Unroll the cloth as required and tear it across into strips about ¼ to ½ inch wide (see Plate 103). If twine is preferred to cloth as tying material, procure balls of soft cotton twine and place them in the melted wax as with the cloth.

Second Method.—This method is used when grafting trees in the Stanthorpe district.

Take 1 lb. beeswax or petroleum wax, 1 lb. resin, and ½ lb. mutton fat or tallow and heat together in a half-kerosene tin; when thoroughly melted immerse the strips of calico which will be about 9 inches wide by 4 or 5 feet long in the hot liquid. When thoroughly impregnated draw the strips through two case boards held *fairly* tightly together over the tin. The mixture is thus distributed evenly through the cloth and the excess squeezed out by the boards is returned to the tin. The strips are hung up for a few minutes to dry and can then be folded and are ready for use. If the boards used for squeezing are held too tightly there will not be sufficient mixture left on the cloth, and if too loosely there will be an excess which is wasteful.

When using either of the above mixtures as a wax paint they should be applied warm, but not hot enough to injure the bud or graft upon which they are being painted.

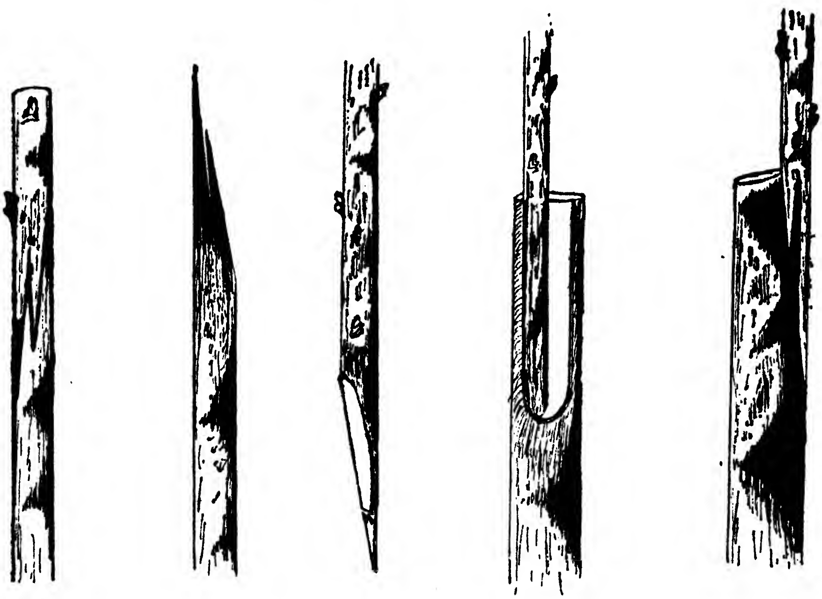


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

Plate 104.

WHIP OR SPLICE GRAFTING.

Whip or Splice Grafting.

This is probably the commonest and best method of grafting nursery stocks, as it is applicable to stocks varying in thickness from that of an ordinary lead pencil to stocks of 1 inch, or even slightly more, in diameter. It is largely used on trees such as deciduous, persimmons, &c. The tongue holds the graft in place, and when the cuts are properly made the graft fits well. When the stock and scion are of equal size, the completed graft should appear as in Plate 104; fig. 1, the scion and stock being cut in a similar manner to that shown in Plate 104; figs. 2 and 3, but when the stock is larger than the scion, instead of making a sloping cut right through the stock, a sloping cut on one side of it is sufficient; a tongue is made in this cut, and the scion fitted to it, care being taken that the inner barks of the scion and stock meet on one

side (see Plate 104; figs. 4 and 5). In preparing the stock the top should be cut off with a slight slope, and the scion should always be placed on the higher side, so that the bark will grow over the wound and leave no dead wood, as would be the case were the scion put on the lower side of the slope. When the graft has been placed in position, it should be firmly tied with any suitable material or waxed calico, and the whole of the cut, including the top of the stock, should be covered with grafting-wax, so as to exclude air and moisture. Whip-grafting of nursery stocks should be done at or slightly below the level of the ground, and the grafts or scions need not contain more than two or three buds.

Bark or Rind Grafting.

This method can be used with trees of all kinds and of all sizes—from nursery stocks which have grown too large to bud successfully to old trees which require working over. Bark-grafting is best carried out simultaneously with the first rise of sap in spring, though the top of the stock, which should be cut off square at ground level or 1 inch or 2 inches above or below (depending on the proximity of the roots to the surface) may be removed at any time during the winter whilst the growth is dormant.

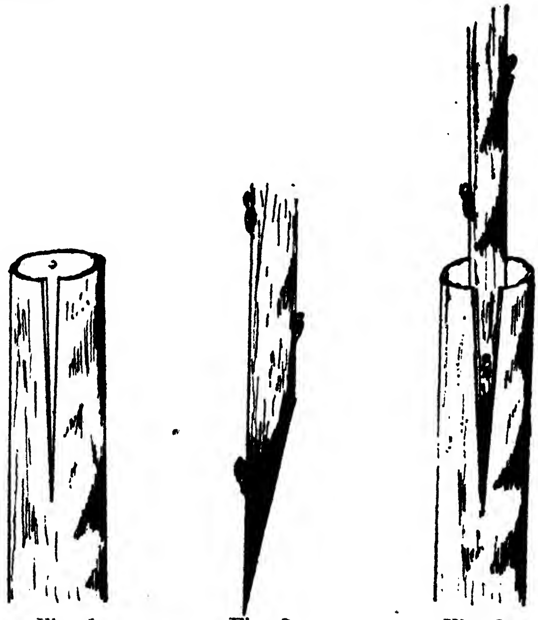


Fig. 1. Fig. 2. Fig. 3.

Plate 105.

BARK OR RIND GRAFTING.

When performing the operation a cut is made through the bark as shown in Plate 105; fig. 1, the bark on either side of the cut being carefully lifted. The scion is cut as shown in Plate 105; fig. 2, being as fine as possible, and is pushed down under the bark of the stock where the cut has been made so that it fits closely to the stock (Plate 105; fig. 3). When in position the scion should be at once tied in place and damp soil heaped up around it to the top bud and mulched with straw or other material.

In making this graft the less the inner bark of the stock is exposed the better, so that it is not advisable to lift the edges of the cut more than a little, but rather to let the scion force its own way.

Fig. 1. Fig. 2. Fig. 3.

Plate 106.

HERBACEOUS OR SIDE CLEFT GRAFTING.

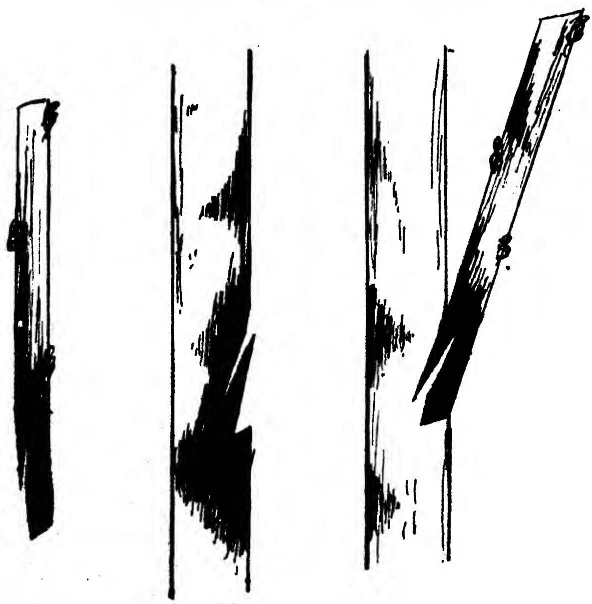


Fig. 1. Fig. 2. Fig. 3.

Plate 107.

HERBACEOUS OR SIDE CLEFT GRAFTING.

When grafting large stocks by this method, two or more scions may be inserted round the same stock if desired, so that in the event of one failing there is another to take its place. Old trees cut down and worked over by this method rapidly attain their former dimensions, and have been known to bear very good crops of fruit in three years.

Herbaceous or Side-Cleft Grafting.

This is chiefly used in the nursery on soft-wooded varieties—such as custard apples, &c.—and is the most successful method for varieties which are slow to make a union or otherwise hard to graft. It is one of the simplest grafts in operation. The scion is cut from both sides to form a wedge (see Plate 106; fig. 1), and a sloping cut is made into the side of the stock (see Plate 106; fig. 2), the head of the tree being left on, and the scion inserted so that the cambium layers of both are brought into contact (Plate 106; fig. 3). The scion should be tied into place and the soil drawn up round the graft.

A second form of herbaceous grafting, sometimes successful in dealing with seedling mango stocks, is best described by reference to the illustration. The head of the tree is not removed. In Plate 107; fig. 1, the scion is shown with a sloping cut on one side only and with the end bevelled. In the first cut an upward incision is made to form a tongue. A piece is then cut from the side of the stock to correspond with the shape of the scion, and a tongue cut to fit that of the scion (Plate 107; fig. 2). Plate 107; fig. 3 shows the completed graft, which should be firmly tied into position, and the whole coated with wax.

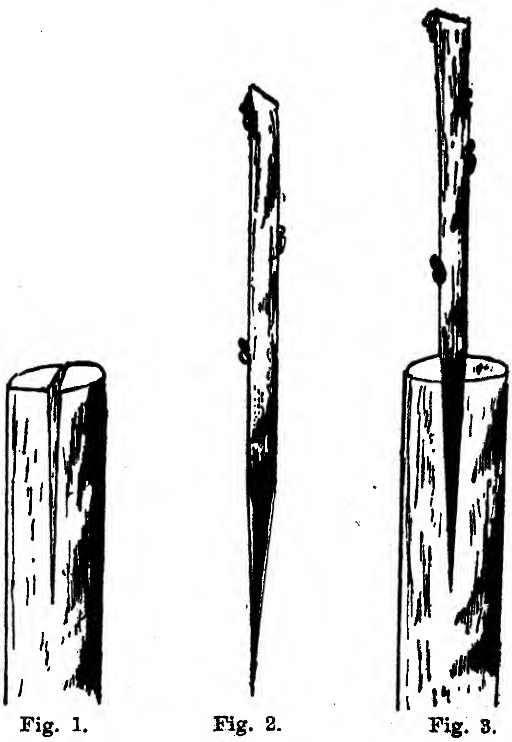
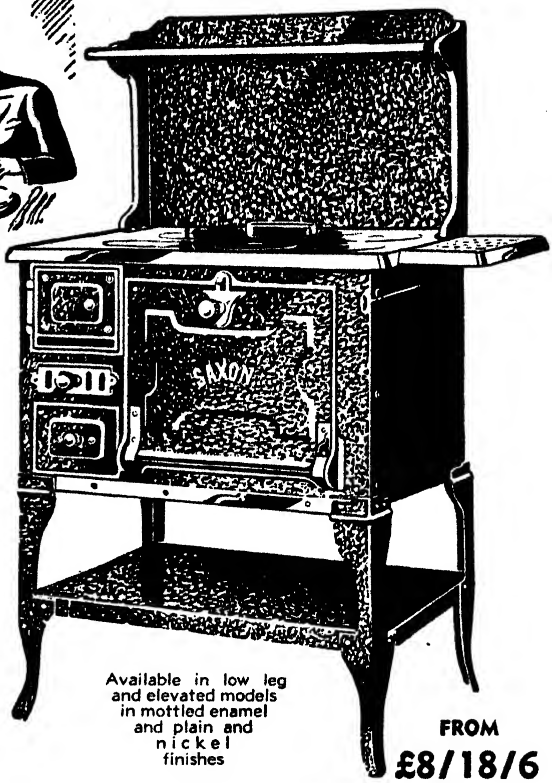


Fig. 1. Fig. 2. Fig. 3.

Plate 108.

CLEFT OR WEDGE GRAFTING.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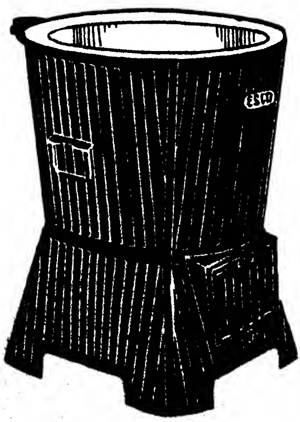
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Cleft or Wedge Grafting.

This method of grafting is also applicable to all sizes of stocks, except very small ones; but where the whip graft can be used it is better to use it than the wedge graft, as the latter has the disadvantage of splitting, and thereby more or less injuring the stock. For large stocks, however, it is still in common use. The stock is cut off square, the edges of the cut trimmed, and then is split open with a chisel (see Plate 108; fig. 1). If the stock is large, the cut may be kept open by the insertion of a small wooden wedge to prevent the pressure from injuring the scion when inserted. The scion (see Plate 108; fig. 2) is cut in the shape of a wedge, and bevelled so that one side of the wedge is thicker than the other, and so that when inserted into the stock it fits well (see Plate 108; fig. 3), and the cambium layers join. A graft can be placed at each side of the cleft, if desired. When inserted, the scions should be tied in place and the whole should be carefully waxed, the cleft being filled with wax to keep out the rain, or the whole may be tied over with waxed cloth. This method of grafting should be done just as the sap begins to move in the stock in spring.

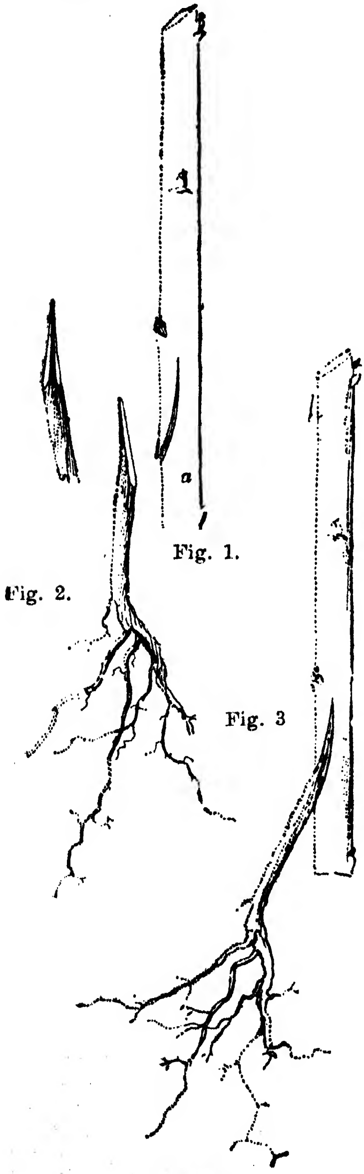


Plate 109.
ROOT GRAFTING.

Root Grafting.

There are two kinds of root grafting. In the first, a small piece of root is grafted on to a scion of the variety it is wished to propagate; and in the second, the scion is grafted on to the root stock just below the ground where the stock is standing in the nursery row, or the stocks are dug up and grafted in a shed or other suitable building, and when grafted are either heeled in temporarily in sand or are planted out in the nursery row. This is known as bench grafting, and on account of the ease and rapidity with which it can be done is often used by nurserymen. In the first case, where a small piece of root is grafted on to the scion, there are two methods employed—one where the root is smaller than the scion, and the second where the root is as large as, or larger than, the scion. These methods are chiefly used by nurserymen for the propagation of blight-resistant apple stocks,

the Northern Spy or Winter Majetin varieties being chiefly used, as both are free rooters when root grafted.

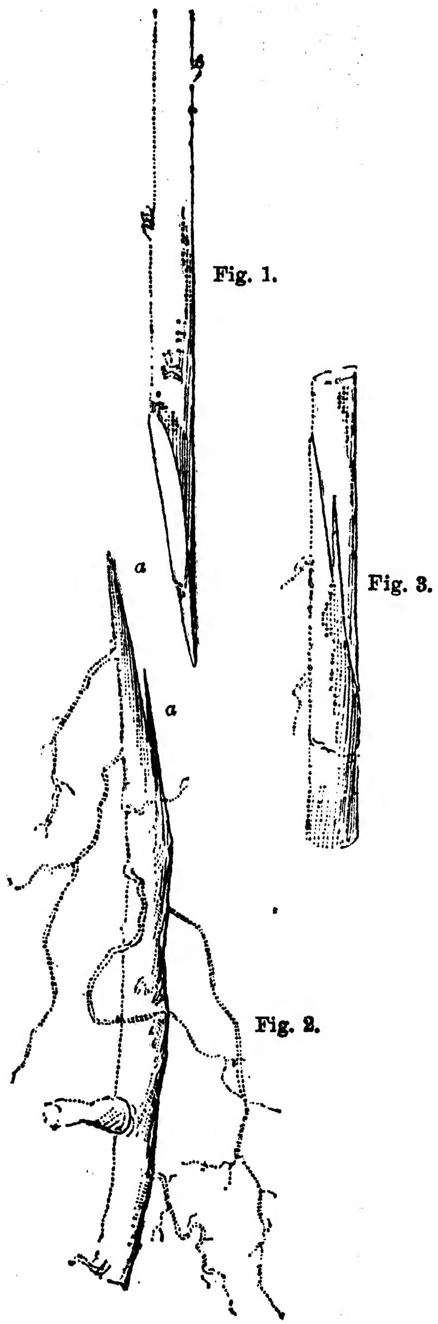


Plate 110.
ROOT GRAFTING.

When the root is smaller than the scion, a sloping cut is made into the scion as shown at (*a*) (see Plate 109, fig. 1), taking care to use a sharp knife, and making a drawing and not a forcing cut so as to avoid splitting; and the root (see Plate 109, fig. 2) is prepared as shown in a similar manner to the wedge graft used in the case of large trees (see Plate 108, fig. 2). The prepared root is then inserted into the cut at (*a*) made in the scion as shown in Plate 109, fig. 3, and is tied firmly in place with raffia or thin calico; no waxing is necessary.

Where the root is as large or larger than the scion, a whip or splice graft is used, which is best described by reference to the illustrations. Plate 110, fig. 1, the scion, shows the sloping cut and tongue at (*a*); Plate 110, fig. 2, the root, showing the sloping cut and tongue at (*a*); Plate 110, fig. 3, the completed graft, showing the use of the tongues and how they fit.

In the illustrations, the root and scion are shown to be of equal size, but if the root is larger than the scion then it is essential that the inner bark of one side of the root and of one side of the scion be brought into contact, taking no notice of the other side, as a union on one side is sufficient. Always tie the grafts firmly so that there is no fear of their shifting once they are placed in position and tied.

Root grafting, as described, can be done during the winter or early spring; the grafts when made being either kept in sand till the nursery is ready or planted out in nursery row direct.

In the second place, when the scion is grafted on to the seedling or other root stock, the method employed is that of whip grafting just described, the scion being firmly tied in place but not waxed, and the soil being then drawn round the graft till only one bud of the scion is left above the ground. If there is danger of the graft dying out, then waxed ties can be used. This method of grafting on to the root stock is often used in nurseries, especially in the case of peaches and other fruits having a soft pithy wood, and is done in spring just as the sap is beginning to move in the stock; the scion, if possible, being more backward in growth than the stock.

Inarching.

Inarching is a form of graftage requiring a considerable amount of care and trouble. The plants are raised in pots or boxes and are ready for working when about the thickness of a lead pencil. When performing the operation the pots or boxes containing the plants require to be firmly secured on a raised platform around the tree selected to provide the scions, so that there is no likelihood of their being shifted by heavy winds. As a further precaution it is also advisable to tie the branches of the scion tree firmly to the platform.

The scions selected should be as nearly as possible of the same diameter as the stocks.

The next procedure is to remove a strip of bark from the stem of the stock so as to expose about 2 to 2½ inches of the cambium layer. The strip should be removed with one drawing cut of the knife and should be not more than 6 inches above the roots. A piece of bark of similar size is then removed from the scion and the two cut surfaces brought into exact juxtaposition and tied firmly with waxed tape.

In about three weeks the stock may be partially severed above the union and the scion below the union. A week later the top of the stock may be entirely removed, and in another two weeks the scion branch may be completely cut away below the union and the plant shifted.

Inarching is best performed when both stock and scion are growing vigorously. The stock should be kept watered, and after performing the operation if the sun is very hot it will be necessary to provide shade.

PROPAGATION BY CUTTINGS.

Certain varieties of plants may be propagated by means of cuttings. Specially prepared beds containing a little decayed leaf mould and a large proportion of sand should be made available, and if the weather is very hot shelter must be provided.

Root Cuttings.—The roots of some varieties, such as citrus, plums, apples, &c., have the capacity of developing eyes which will produce shoots, and this fact is in some instances made use of to propagate these species. Roots from ½ inch to 2 inches in diameter may be taken as the most suitable size, and these should be cut into 8-inch or 9-inch lengths. If a saw is used to sever the cuttings it is advisable to smooth the cuts with a sharp knife. The cuttings should be placed

in a trench dug in the prepared bed, leaving about 2 inches of the thickest end above the surface. The soil needs to be well firmed after planting, and watered, and subsequently kept damp until the cuttings have grown enough to plant out.

Stem or Branch Cuttings.—These may be separated into hardwood and softwood cuttings, and although many varieties will root readily without special care others require more attention.

For hard-wooded kinds cuttings should be made 9 to 12 inches long from well-matured growths. The leaves at the base end should be cut off close to the cutting, whilst the top leaves should be trimmed off, leaving only about one-third of the leaf area. The butts should also be trimmed off with a sharp knife. Care must be taken at all times to avoid bruising or allowing the cuttings to wilt. Subsequent treatment should follow along the lines of the root cuttings.

Softwood cuttings require more care since they are, as a rule, made by taking about 3 inches of the tender, immature terminal ends of the twigs, and removing about two-thirds of the leaf area. The cuttings should then be placed in a box containing 5 or 6 inches of clean sand, and kept in a well shaded place. The sand requires to be kept constantly moist, though not wet, as too much water will rot the immature growths. Rather than apply a lot of water at one time it is better to give a light spraying often.

Autumn is generally regarded as the best season for propagating from cuttings. They are then fairly plentiful and root easily.

Layering.

Layering may be defined as the rooting of a branch whilst still attached to the tree. It is a method of propagation frequently practised with varieties difficult to strike from cuttings or "hard" to graft.

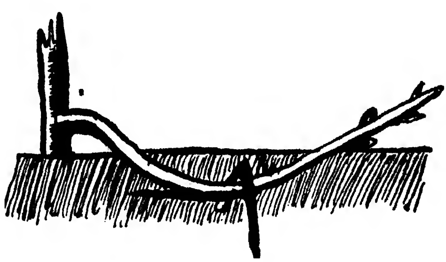


Plate 111.
LAYERED BRANCH.

The method is to bend the lowest branches of the plant downwards to the ground and peg them in shallow trenches by means of forked sticks (Plate 111). The branches are cleft with a sharp knife at the points where the roots are desired and small stones or sticks inserted to keep the cuts open. The trenches should then be filled with damp soil, leaving the ends of the branches above the surface. When sufficient roots have been developed the layers may be severed from the parent tree and dug up and planted out, removing at the same time a portion of the tops.

Marcottage or Goatee Layering.

Marcottage is a variation of layering. It is seldom used here, other means of propagation being preferred. Briefly, a selected branch of the parent tree is "tongued" upwards and the cut kept open by the insertion of a small stick. Around the wound a pad of damp soil is tied firmly in a piece of sacking or other material. The soil requires to be kept constantly damp to induce rooting, and this is assisted by tying a tin or other suitable receptacle filled with water above the pad of soil in such a way that there will be a constant drip of water on the sacking to keep it damp. As soon as the roots penetrate to the sacking the branch may be severed at a point below the roots and planted, removing at the same time portion of the young foliage.

WIND BREAKS FOR BANANAS.

During a cold snap, the necessity of suitable wind breaks around banana plantations soon becomes apparent by the number of frosted plants.

When falling scrub to plant fresh areas, the necessity of retaining a belt of scrub about 2 chains wide around new areas cannot be too strongly stressed. Where the locality is definitely liable to frosting, it is a good plan to make the track through the scrub or forest into the plantation on a zigzag formation. In areas not liable to frosting, a wind break will greatly assist in keeping out cold winds which chill the plants and thus retard their growth.

Where plantations are already established, growers should give attention to the planting of wind breaks, of which two types are easily made. Lady's Finger or Sugar bananas planted in close formation round the plantation will produce a thicket, and so afford protection. Several border rows of Java cane will also give some protection against frost and wind.

Growers should remember that too much hard work is put into falling scrub, burning off, logging up, and planting areas to excuse the neglect of reasonable precautions against the possible damage to bananas from frost or cold winds, for one severe frosting followed by a warm day will render their plantations worthless.

"RUBBER BELTING ON THE FARM."

A CORRECTION.

In the article "Rubber Belting on the Farm," in the May issue of this Journal, an error in the original typescript was overlooked, and readers are asked to note the following correction:—

In the first line of the third paragraph on page 390, the word "caused" was used instead of "cured." The sentence as printed was "Persistent slip on the pulley may be caused by bolting or riveting a piece of rubber belting to the face of the pulley." The word "caused" in the sentence altered completely its meaning. "Cured" is the word that was intended to be used and not "caused."

The corrected sentence should read: "Persistent slip on the pulley may be cured by bolting or riveting a piece of rubber belting to the face of the pulley."

The Banana.

By Officers of the Fruit Branch.

THE banana is the fruit most largely cultivated in Queensland. It is a tropical plant, and though many years ago it was grown extensively in the North, it is now cultivated in all coastal districts experiencing sufficient rainfall, with the greatest production centred in the southern portion of the State.

VARIETIES.

The chief variety grown is the Cavendish, whilst others of importance are Lady's Finger, Sugar, Mons Marie, and Gros Michel.

The Cavendish is most favoured because, having a dwarf-growing habit, it is less subject to serious damage on hillsides from heavy winds.

The Lady's Finger is a tall-growing robust plant. It is less subject to frost injury than the Cavendish, and thus can be grown in lower situations. The fruit is slightly angular and possesses a piquant flavour.

The Sugar is another tall-growing variety, but is usually less robust than the Lady's Finger and is particularly subject to Panama disease. On this account its cultivation is not being extended.

The Mons Marie is a sport from the Cavendish of local origin. It is reputed to have been grown first at Buderim Mountain. The plant is taller than the Cavendish, but not as tall as the Lady's Finger. The bunches and individual fruits are large and its cultivation may in a few years exceed that of the Cavendish.

The Gros Michel is the tallest grower, attaining a height in some instances of 30 feet. It luxuriates in the tropical conditions of North Queensland, but is not favoured in southern districts on account of the great height to which it grows. It is claimed that the flavour of the fruit is not equal to the Cavendish, but it carries better, and has the advantage of size. The fruit is produced on long bunches with wide inter-spaces, and is usually much less curved than the Cavendish.

Varieties of no importance are Dacca, Red Dacca, and Plantain.

ESSENTIALS TO SUCCESS.

The *first essentials to success* in banana growing are that—

(1) Rainfall is not less than 40 inches per annum;

(2) The site is above frost level;

(3) The altitude does not exceed 1,000 feet above sea-level;

(4) The soil is fertile and well-drained;

(5) The aspect is suitable and well-sheltered.

In the southern parts of the State rainfall averages about 50 inches per annum. Hillside sites are generally selected. The soil is mostly of fertile volcanic origin and is often rough and stony, the latter feature particularly favouring vigorous growth of the plants. The land in its virgin state is usually covered with a dense growth of vine jungle. Though in some instances plantations situated at a greater altitude than 1,000 feet have produced reasonably good fruit, generally it may be accepted that bananas above this height are not commercially successful. The growth of the plants is frequently slow and stunted, and the bunches hang several months longer before reaching maturity. Also it is noted that a trouble known as Cigar End is more in evidence in such situations.

Considerable areas of good forest soils have been planted with bananas with some measure of success. The bunches produced are of good size, and the fruit is of excellent eating quality and carries better than that produced on the richer scrub soils. After burning off and planting, the whole of the forest and should be mattocked to a depth of, at least, 6 inches for best results and naturally, since the banana is a gross feeder, artificial fertilizers should be applied to maintain the life of the plantations over several years.

For a plantation site a north-easterly aspect well protected by a natural wind-break of mountains or timber on the western and southerly sides is regarded as the ideal situation. Easterly and south-easterly aspects may be used provided they also are well protected from cold winds. Too much attention cannot be given to the provision of wind-breaks. The leaves are the factories in which the plant's food is manufactured, and naturally the less they are damaged by wind or other agency the greater will be the amount of food available for the plant's use.

In the northern part of the State alluvial lands yield the best results, as growth throughout the year is even and fairly continuous.

PREPARATION OF THE LAND.

The preliminary preparation of scrub land is confined to merely felling the timber at a suitable time—generally during winter—allowing it to dry for several months, and then burning off. Subsequently unburnt timber up to 12 inches in diameter is piled together and refired, the heavier logs being allowed to remain where they fell.

PLANNING AND PLANTING.

In the south planting may be proceeded with from September to early March, though usually planting before the end of December is advisable in so far that the plants get a better start before the winter and fruit in a shorter time. Opinions vary as to the best month for planting to avoid having the main bunching during the period when short fruit known as "November dumps" are thrown. No definite rule can be laid down in the matter, as much depends on conditions existing in individual districts and the situation in which the plants are to be planted. Intending growers should ascertain the experiences of other growers in the district on the matter.

The land should be marked out at distances of 12 feet by 12 feet or 10 feet by 10 feet and holes about 12 inches deep and 18 to 24 inches across dug to receive the suckers. Various distances apart at which to set the plants have been advocated, but experience has proved that distances of 6 feet by 6 feet and 8 feet by 8 feet are not successful. Though 12 inches may be regarded as a safe guide to the depth of the holes at planting, the influence of the soil drainage and local conditions have an important bearing on the matter. Obviously, for instance, it would not be advisable to dig a deep hole in a soil with a heavy clay subsoil close to the surface, whilst in deep alluvial lands 18 to 20 inches would not be too great. When planting it is not necessary to completely refill the hole. The soil will gradually work in during cultivation and heavy rains. For practical purposes it is sufficient if the base of the plant is covered to a depth of 6 inches. Do not use the soil which has been dug out of the hole, but break down the surface soil from around the edges with a mattock, thus providing friable soil for the young roots to start in.

Too little attention has in past years been paid by growers to the damaging effect of soil washing in hillside plantations. It is well worth the labour expended to provide terraces as frequently as possible across the hills. These may be built of logs or stones between the rows of plants. Growers who have adopted this practice have cut larger-size bunches and have considerably extended the period of productivity of their plantations. There is no reason to doubt that the comparatively short life of Southern Queensland plantations is often due to the loss of valuable top soil by erosion. The holding of this soil on the hillside, combined with proper cultivation and fertilizing, will add several years to the present recognised profitable life of banana plantations.

Green manuring for the combined purposes of reducing soil losses during the rainy season and to provide additional humus should also be given serious consideration by growers.

PLANTS.

Planting is carried out by means of suckers (offshoots), bits, or butts. Suckers are most generally used on account of their availablity and convenience for transport. Butts are rarely used and are not recommended, as they present a ready means of transferring beetle-borer to a new plantation. Bits are portions of old butts which have been chopped into pieces—each piece having one eye or bud from which a plant will develop. Very small suckers are not desirable. In no case should they be less than 3 inches in diameter through the corm. Care should also be taken not to obtain water suckers—i.e., those which have thrown large leaves at an early age. The best suckers are those about 18 inches ling, which taper from a well-developed base to a top of comparatively long, narrow, sword leaves. If such suckers have developed the first stages of full foliage and are desired as plants they should be cut off several inches above the corm after being dug. If used at a still later stage the stem should be cut off close to the corm and the centre gouged out to prevent further growth from that source. The butt will be found to contain several more or less developed buds or eyes distributed over its surface; these should also be gouged out and one only left to grow from around the base. Each plant should be carefully trimmed, the roots being cut close in to their bases, and where there is any suspicion that beetle-borer may be present the external covering should also be pared off.

CULTIVATION.

Given fair conditions the young banana plant will require little attention for some time. Weed growth will sooner or later appear and should be immediately suppressed. On hillsides it is rarely possible to use horse implements, consequently hand-chipping and pulling the weeds must be resorted to. Spraying with various weedicides is practised by some growers, and with a suitable spray the practice has much to commend it provided cultivation is not altogether neglected. A plantation needs to be chipped at least twice a year to ensure good results. There is one feature growers should never overlook, and that is that it is not possible to grow bananas and weeds at the one time with any degree of success, particularly whilst the banana plants are young. It is of the utmost importance to suppress all weeds in the early stages of the plants' growth.

DESUCKERING.

The right time to remove unwanted suckers is when they first appear above ground. The parent plant then does not waste energy building up suckers which have later to be destroyed.

Under average conditions the usual method has been to allow only one plant to grow for the first four months. Then allow the first follower to develop, preferably at the side. After another four months allow a second sucker to develop on the opposite side of the parent, and after a similar interval allow a third sucker to develop at the side of the first. If possible, never allow suckers to grow from the down hill side of the parent, as in a year or two, unless the soil is continually banked up around the plants, they will be growing on the top of the ground. For this reason also the suckers which are retained as followers should originate well down in the ground and not at soil level. After the third sucker has been allowed to develop allow the fourth sucker to come from the side of the second, and so on. By following this method of pruning one developed bunch only is permitted to hang on each stool at one time, and as the plant is putting its energy into the bunch it will be a good one and worth more than two or three smaller bunches. Furthermore, succeeding bunches follow in fairly regular order.

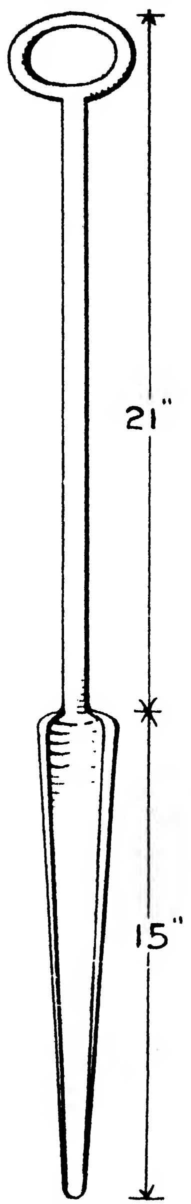


Plate 112.
BANANA DESUCKERING GOUGE.

Some growers have the idea that no suckers should be removed from the parent until it has borne a bunch. Such is an entirely erroneous idea, and probably developed from the fact that suckers *intended for replanting* should only be taken from parents which have borne a bunch. If taken before, the suckers are soft and invariably produce a very poor first bunch.

In desuckering it is advisable to avoid injury to the roots of the parent plant so far as is possible. The implement in use most favoured is the gouge (Plate 112), made from a 3-feet piece of spring steel 1¼ inches by ¼-inch. About 15 inches of one end is hammered out, and the edges turned up and sharpened. This "blade" is tapered to a point of about half-an-inch across to facilitate its entry well into the corm of the sucker after the top has been severed, whilst the sharp curved edges make it easy to cut out a cone-shaped piece of plant and prevent further growth. The top of the gouge is generally fitted with a handle of ½-inch round iron for better leverage.

THE ONE-BUNCH ONE-SUCKER SYSTEM.

The great problem facing the banana grower is the production of first-class fruit. Of recent years in many instances the sites for banana growing have shifted from the extremely fertile scrub soils to forest soils of varying fertility and aspect. The necessity of grubbing the forest soil and the use of fertilizers has considerably increased the cost of production, and unless a definite system of desuckering is carried out the production from this class of soil will not often be commercially profitable.

A system of desuckering, which has been tried and proved in the Eumundi and Yandina districts and is locally known as the one-bunch one-sucker system, has as adherents, the principal growers. Growers who have carried out the system have had as much as 200 cases to the acre for the first cut off forest soil, and by the selection of the correct follower for the second and subsequent cuts have reached an average of 500 cases per acre during the life of the plantation.

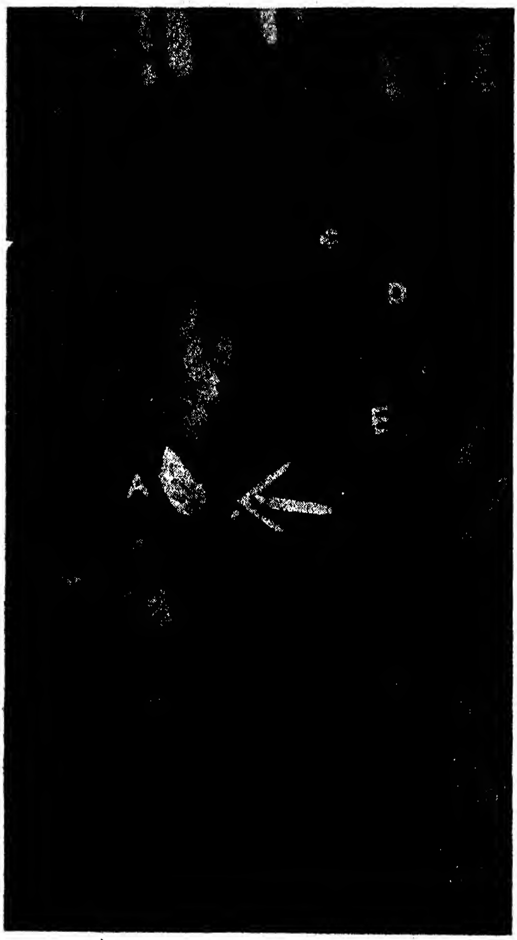


Plate 113.

"A"—also indicated by the arrow—shows the correct sucker well down which should be left to produce the follower. "B" is a "sitter" formed about ground level and should be destroyed.

"C" shows a sucker intended for planting ready to be detached from the parent corm. If the top is always severed with a sloping cut as shown, and the sucker planted with the lower point of the cut "D" facing up hill, the follower is nearly always certain to grow in the right position, shown approximately at "E."

The system really starts with the selection of the stock for planting, and in this connection well developed eyes with a portion of the corm adhering, and known as bits, are given first preference, and healthy suckers of more than 3 inches diameter are next best.

The bits or suckers are planted in a hole dug to a depth of about 12 inches. It is advisable not to cover the plant with more than 3 to 6 inches of soil at the time of planting, thus preventing the corm from forming too near the surface. The distance apart should not be less than 10 feet x 10 feet.

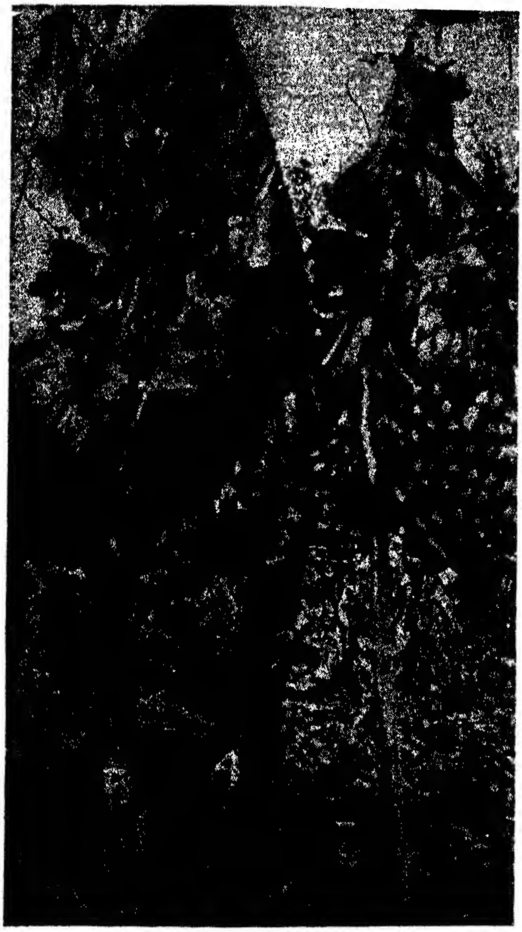


Plate 114.

SHOWS THE PARENT PLANT.—"A" with a matured bunch and a sucker "B" of the correct size and in the correct position at the side for the following season.

Suckers are a popular form of stock, and in placing these in the holes the followers for the second and succeeding crops can in a big percentage of cases be definitely ascertained. The side of the sucker furthest away from the parent usually produces the correct follower, and the sucker should be placed with the correct side facing the direction from which it is desired the follower should grow (see

Plate 113). On very steep slopes a follower at the side is preferred for the reason that if allowed to grow on the top side the old corm when rotting allows the young plant to sag forward, whereas if on the side the ground helps to stay it. The maiden plant must be regularly desuckered *as soon as the suckers appear above the ground,* this operation being most important, having, as it does, a direct influence on the size and quality of the expected bunch.

Plate 115.

SHOWS THE THIRD GENERATION OF PLANTS.—"A" is the original plant from which a bunch has been cut, "B" is the first follower ready to bunch the second season, and "C" is the follower for the third season. Note that "C" is in a direct line away from "A."

Where a grower has had experience in a certain locality, the number of months required to throw a bunch can in most cases be used as a basis in determining the time when the follower is allowed to come. From observations of quite a number of seasons and other factors in

North Coast districts, a period of approximately fourteen months is the usual time taken from planting to bunching. Using this with local data, followers can be left to insure the avoidance of fruit being thrown during November, as such fruit, having been formed in the plant in the winter, is usually unprofitable.

The most important factor governing the system is the selection of the correct first follower, and although some seasons make it somewhat hard, a careful observant grower can get at least 95 per cent. correct. On examining a banana plant with a number of suckers surrounding the butt, it will be found that the majority, and in some cases the whole, of the suckers are growing from eyes or buds that are in a circle at or near the soil level. These suckers are referred to as "sitters," and when allowed to develop into matured plants are sitting more or less on the surface with a root action that is superficial. *Such suckers are to be avoided as followers.*

Usually after the plant has made good growth and has been regularly desuckered, it forms one or perhaps more suckers that come from buds or eyes directly *below* the top layer of eyes and at least 5 inches lower in the soil: *these are the correct followers,* and if the injunction to place the suckers the correct way when planting has been carried out, by the time the bunch is thrown on the parent plant the grower will have a nice sturdy spear-leaved follower of from 2 to 4 feet in height on the top or at the side according to the contour of the plantation (see Plate 114). It is of the utmost importance that the follower is above ground *when the bunch is thrown on the parent plant.*

Once a grower has reached the stage of having his next year's follower correctly placed as regards position and time his main troubles are over, as it has been proved definitely that the third and succeeding correct followers, to the extent of 95 per cent., are true follows through, i.e., in a direct line with the original plant and the first follower (see Plate 115). The straight follow-through demands that the planter must ensure that the first follower does not grow on the down hill side or towards a fixed object such as a stump or a stone.

The objectives of this system are the same as are aimed for in every other line of fruit production where pruning is resorted to for definite results. A desuckered banana plant enjoys a maximum of sunlight, available food and moisture, and must, when these and other essential factors are present, produce a superior article. In addition, a one-bunch one-sucker plantation can be regularly and effectively baited for beetle and offers every facility for inspection for bunchy top and other diseases.

TRASHING.

By trashing is meant the removal of dead leaves from around the stems of the plants. Carry out this work after the winter. The banana is a tropical plant and growing in Southern Queensland under semi-tropical conditions, the dead leaves provide a certain amount of warmth for the stem during the colder months.

THE ENDLESS WIRE CARRIER.

The use of the endless wire system for transporting bunches of bananas from the plantation to the packing shed means a saving of much time and hard work for the banana-grower. The use of the system need not necessarily be confined to banana plantations; any hillside orchardist will find it a great convenience.

Briefly, the idea of the system is to despatch the fruit from a central point in the plantation on carriers which run on carrier wires to the packing shed. The carriers are attached to an endless wire running round grooved wheels at each end of the system. The carriers are fixed in such a way that as one is sent to the packing shed with its bunches the second carrier is returned uphill for its load.

The system is not difficult to instal. One of the chief things is to see that the structure is strongly built. A steep grade does not necessarily make the system impracticable, as the provision of a braking system serves to check the speed of the carriers.

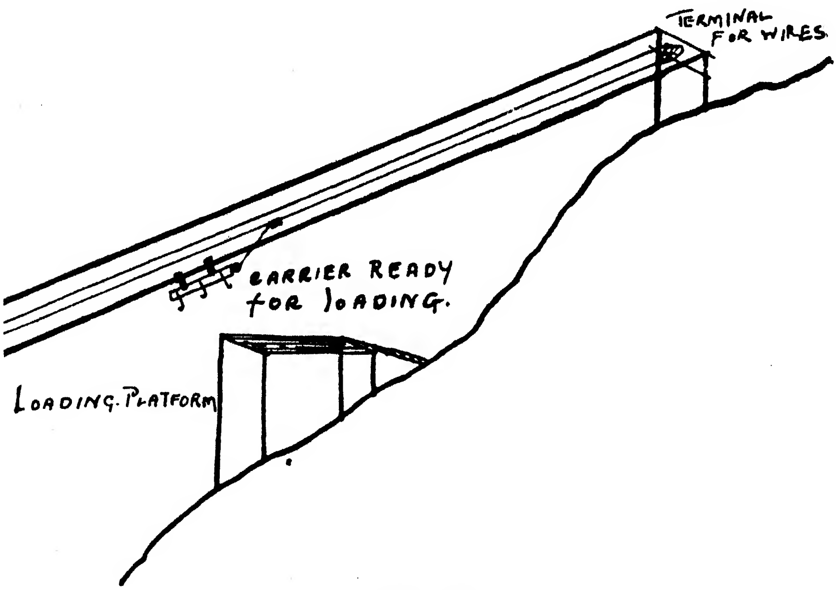


Plate 116.

First a central part of the plantation must be selected as a despatching point. This should be conveniently situated so that bunches from surrounding parts of the plantation can be easily carried to it. From this site select a position at the bottom of the plantation for a receiving station. A suitable place is usually found on the top of a small rise, as this will give the wires greater height so that the bunches will not brush against the plants whilst they are in transit. This receiving terminal should also be suitable for the building of a packing shed in order to save unnecessary handling of the fruit, and it should therefore have easy access to a roadway. Difficulty may be experienced on

some slopes in obtaining sufficient height for the wires. In such cases, a staging can be built at the despatching point and the terminal for the wires made higher up the hill, somewhat as shown (Plate 116).

Construction of the System.

Reference to Plate 117 will explain the building of the system. The main posts marked "A" at both top and bottom terminals must be solid and about 12 feet long. They require to be firmly fixed in the ground, at least 4 feet deep and preferably 5 feet, and should be well braced. In Plate 26 the posts at the despatching end are shown anchored to a convenient stump for additional strength. The distance between the posts at each terminal may be about 6 or 8 feet.

About 6 inches from the top bore inch diameter holes through each of the posts for the carrier wires ("B"). The holes in the posts at the top end should be inclined downhill and those through the bottom posts inclined uphill so that the wires when strained will not kink at the entrance to the holes. A straight pull also makes it easier to strain the wires, which should be drawn as tightly as possible. To do this, tie the wires firmly round the posts at the sending end, and at the receiving terminal wind the slack of the wires round good strong rollers ("C"). If wooden rollers are used, they should be made of tough cross-grained timber, 4 inches in diameter, clear of sap. Straight-grained timber is liable to split and is not capable of carrying the load. Iron levers $\frac{3}{4}$ inch to 1 inch diameter ("D") passed through holes bored at right angles to one another in the ends of the rollers will give a good purchase and enable the wires to be tightly strained. For the carrier wires, heavy 10 by 12 gauge oval steel wire is sold specially for the purpose. This wire has a breaking strain of 2,140 lb. and is suitable for all ordinary distances up to approximately 600 yards. Some systems in use are a mile long, but heavier wires are required for these.

For the endless wire ("K") 12 by 14 gauge steel wire is generally used. This runs round grooved wheels fixed at each terminal.

Posts marked "E" are sunk and well braced at the receiving terminal. If a good anchorage such as a stump is not available at the despatching end, similar posts should be erected there also. Cross bearers ("F") made of 4 by 3 inch hardwood to carry the wheels are then bolted across the posts. Care is necessary in fixing the bearers, as in order to prevent the wire running off the wheels they must be tilted slightly, the wheel at the top being inclined downhill and that at the bottom uphill. In Plate 26 it will be noted that at the sending terminal the top bearer is placed across the front of the posts and the posts are checked out to allow the bottom edge of the bearer to be completely housed in the posts. The lower bearer is placed across the back of the posts, and in this case the posts are checked out so that the top edge of the bearer is completely housed. A piece of solid hardwood is next bolted to the top of the bottom bearer to form a small platform ("G"), so that when a hole for the axle of the wheel is bored through the top bearer the auger will continue on and bore a corresponding hole in the platform for the other end of the axle. The wheel, when fitted, will then be inclined towards the wheel at the bottom terminal, where a similar procedure is followed to tilt the wheel uphill. Old motor cycle or motor car wheels serve the purpose very well and may be obtained at any car wreckers for a few shillings each.

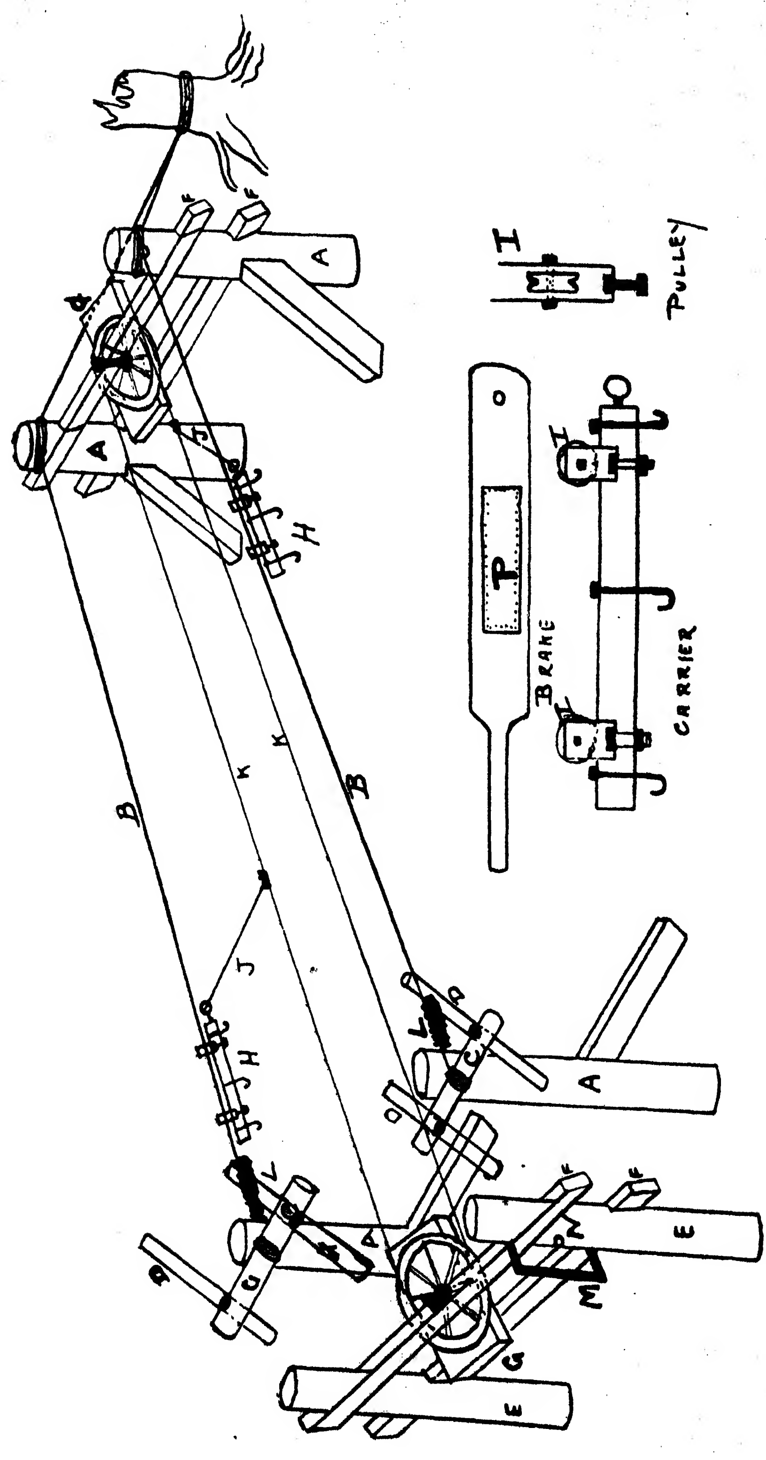


Plate 117.
PLAN OF AN ENDLESS WIRING SYSTEM FOR BANANAS.

The endless wire, when fitted, should be fairly tight, otherwise it will tend to run off the wheels. The approximate length required should be measured and run round one of the wheels whilst the latter is in position, and tied with a piece of tie wire to prevent it slipping off. The other wheel should then be lifted out of its platform and brought forward several feet. The wire should then be placed around it, and the two ends tied. The tie should be strongly made. The wheel is next drawn back to its correct position on the platform, and the axle inserted to hold it in its place. The use of a Spanish windlass made with a rope and two or three pulley blocks is an easy way of drawing the wheel back into place. If facilities for making a Spanish windlass are not available, the wheel with the endless wire tied on may be strained through a post fixed behind the terminal posts ("E") in the same manner as the carrier wires are strained. If the endless wire is not tight enough, the join will have to be broken, the wire shortened, and the work done again.

Construction of Carriers.

The frames of the carriers ("H") are constructed from pieces of hardwood measuring about 4 feet long by 3 by 1 inches. Holes are bored for the hooks, as shown, from which to hang the bunches. The pulleys ("I") can be made by a good blacksmith. The pulley frame is usually 1½ by ¼ inches iron bent as shown. Through the bottom a ⅜-inch hole is bored for a bolt to fasten the pulley to the carrier. A second ⅜-inch hole is bored through the two sides for a steel bolt to serve as an axle for the pulley wheel, which can be an ordinary grooved wheel of about 2 inches diameter. The pulley wheels should be kept frequently and liberally oiled, and to facilitate this a small hole bored through the pulley wheel above the axle bolt will be found of considerable benefit. The pulley frame is partially housed in the wooden frame of the carrier, as shown, by mortising out a piece of the wood and then bolting right through. At the end of the carrier a hook to which to tie the tail rope ("J") is screwed in. The carrier is fitted on the wire ("B") by removing the axles for the pulley wheels, fitting the wire in the pulley frames, and then replacing the wheels. The tail ropes should be long enough to allow for a sag in the carrier wires when carrying a load, and they should be firmly fastened to the endless wire to prevent slipping. Also, if one tail rope is tied to the join in the endless wire, the join will not then have to run round the wheels, and the tie will therefore not cause any obstruction. It is also a good idea to fit a swivel in the tail rope, near where it is tied to the endless wire, to prevent the tail rope from twisting round it. At the bottom terminal of each of the carrier wires, a piece of wood ("L") about 2 feet long wired on will act as a stop to hold the carrier when it arrives with its bunches, and prevent the latter from bumping the posts and bruising the fruit.

The Brake.

The brake is made from a piece of solid hardwood fashioned with a handle like an elongated cricket bat. It should be loosely fastened with a long bolt to one of the bottom posts at the point "N." For extra strength a piece of iron ("M") may be bolted through the post to form a D, through which the brake is inserted. The brake should be only loosely bolted, as it must be capable of being moved forwards and backwards, according as it is pressed against the wheel to check its speed or released to allow the wheel to spin faster. A piece of leather ("P") tacked to the face of the brake where it comes into contact with the wheel will increase its efficiency and reduce friction.

Green Manuring the Orchard.

By Officers of the Fruit Branch.

BY green manuring, or cover cropping as it is sometimes termed, is meant the growing of suitable green crops in the orchard to be ploughed or otherwise turned under to rot down and form humus. Humus is defined as the product of the decay of organic substances and one of the most important constituents of a fertile soil. It improves the texture and assists in maintaining fertility and the retention of moisture In tropical lands, when virgin timber is cleared, natural humus becomes rapidly depleted due to leaching by heavy rains and through exposure of the land to the direct rays of a hot sun. The orchardist, therefore, who does not appreciate the value of supplying his land continually with humus, soon finds that his trees return him poorer results each year whilst his land becomes hard, baked, and dry. The growing of green crops must therefore be regarded in the light of essential orcharding practice if the grower wishes to maintain and improve soil fertility. Farmyard manure is the ideal manner of supplying humus to a soil but, unfortunately, this is not always available in sufficient quantity. Green manures are therefore called upon to provide the deficiency, and

Plate 118.

A GREEN MANURE CROP OF FIELD PEAS AND BARLEY.

by their growth they also have the advantage of reducing soil erosion during the rainy season. Further, their incorporation with the soil enriches it by the addition of certain essential plant foods, such as carbon, oxygen, and hydrogen, which are absorbed from the air. The compounds that result from the crop decay increase the absorptive power of the soil and promote aeration, drainage, and granulation—conditions of importance where successful plant growth is concerned. If the crop grown is a legume, the store of nitrogen is also increased by the absorption of this element from the air.

In established orchards when planning the growth of green-manure crops, care should be taken to avoid, as far as possible, their competition with the trees for soil moisture, particularly during the active period of tree growth and fruit development. Under no consideration should trees be permitted to suffer from lack of moisture.

In coastal orchards the general practice should be to utilise the summer rains. By planting about late November, a good germination may usually be obtained, since, under ordinary weather conditions, November is showery. The crop may then be permitted to grow until

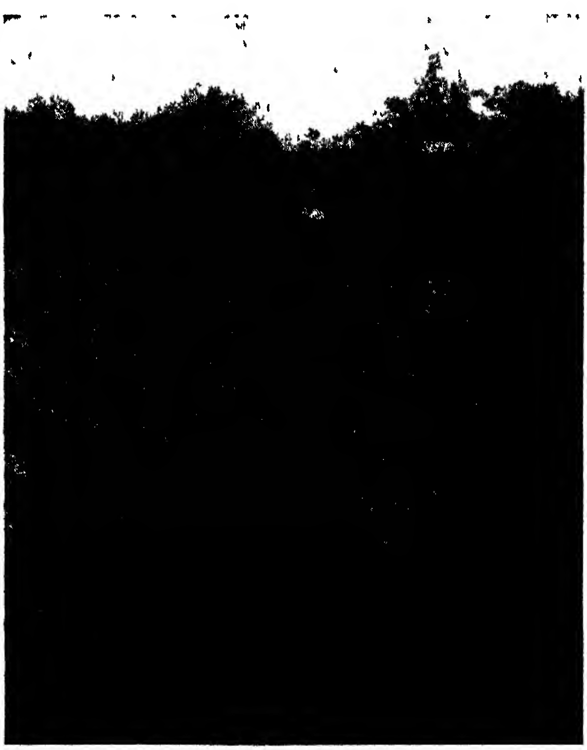


Plate 119.

A GREEN MANURE CROP OF NEW ZEALAND LUPINS.—Tops green:—36 tons to acre Roots:—4.8 tons to acre.

about the end of February, which period will cover the rainy season, ensuring a good bulk for turning under, and incidentally, checking soil erosion.

Plate 120.

GREEN-MANURE CROP OF MAIZE READY FOR TURNING UNDER.

The districts in which irrigation facilities are available, or where autumn and late rains are seasonable, will be best served by planting late autumn and winter green-manure crops. Such crops, however, should not be permitted to grow over into the active spring period.

In newly planted orchards, trees up to four or five years of age seldom occupy more than a relatively small proportion of the total area upon which they have been planted. This factor may be early utilised to build up a reserve of vegetable matter in the soil by thickly inter-planting cover crops up to four or five years. The tree roots do not extend far from the trunk and do not take up the amount of space occupied by those of older established trees. Thus cultivation may be confined to the immediate vicinity of the trees; and by far the greater amount of space down the centre of the tree rows may be occupied in growing both summer and winter green crops. A strip along each side of the tree is thus being cultivated frequently.

The choice of the particular crop to grow will depend upon the season, the amount of water available, and the length of the growing period.

As the main essentials of a desirable green crop are rapid and succulent growth, it is of considerable benefit to apply a light dressing of fertilizer when sowing the crop. Both legumes and non-legumes will benefit considerably by the application of 1 or 2 cwt. of superphosphate, and often the addition of similar amounts of ammonium sulphate is advisable, particularly when growing non-leguminous crops.

In regard to the choice of crop to grow, Crotalaria, maize, Poona peas, and Black Cow peas grow well in coastal districts when planted during November or December, according to seasonal conditions.

Under normal conditions these plants will have made satisfactory growth and will have produced a good body of succulent tops for turning under during March and April.

For the winter green-manure crop, field peas and barley, tick beans, mustard, and in some districts lupins and vetches have proved satisfactory.

Planted in March, good bodies of material have been ready for turning under in June. Here again, except perhaps in practically virgin soils, it is very desirable that a suitable fertilizer be used at planting to ensure quick growing and succulent plants.

Plate 121.
In Well-established Orchards or Plantations Green Cropping Should be Confined to Narrow Strips down the Middle of the Rows.

SORGHUM MIDGE ON THE DOWNS.

A considerable acreage of grain sorghums was planted later than usual on the Darling Downs this season, partly owing to inadequate spring rains and partly to difficulties encountered in preparing the land for planting when rain did fall. Many of these late-planted crops have suffered severely from sorghum midge, a pest which infests the heads when they are flowering and inhibits seed development.

Midges survive the winter as pupae in sorghum heads lying on the ground or in threshing debris which has not been destroyed when the previous crop was harvested. From these pupae the fragile, red-bodied adults emerge in spring and early summer. Midges are, however, comparatively few in numbers until mid-summer, when both cultivated and wild sorghums begin to flower in weather which is favourable for a rapid increase in the population. From then on during the remainder of the season the pest is extremely active. Johnson grass, Sudan grass, saccharine sorghums, and grain sorghums are all attacked, but only the injury to the grain sorghums is of economic importance.

It is difficult to assess the amount of damage to a grain sorghum crop without entering the field and examining the heads. If the infestation is very considerable, the heads will be carrying little or no grain. Under these circumstances, it would be pointless to hold the crop to maturity when the considerable amount of green feed available at present can be put to good use for stock. If allowed to remain, the forage value of the crop will be lost and the small amount of grain will not warrant harvesting. Farmers with grain sorghum crops on their holdings should, therefore, examine them as soon as possible. Nothing will be lost if the crop is good, but much will be gained if crop prospects are poor, for valuable forage can then be fed to cattle or conserved for future use as silage before it dries out and goes to waste.

Some Values of Green Manure Crops.

BY N. G. CASSIDY.*

WHILST it is desirable that all Queensland cane farmers should grow green manures as a regular practice, many do not yet take advantage of this very valuable and efficient adjunct to cane production. This paper is a contribution to the knowledge of green manures in the hope that the use of them may be forwarded thereby. The importance of leguminous crops assumes a fresh significance since both the cost and availability of nitrogenous manures, such as sulphate of ammonia, have introduced their inevitable problems.

During the past few years a number of analyses and soil investigations have been undertaken in connection with green manure cultivation in the sugar areas. The results of these studies provide many interesting phases and these will be discussed in this short paper.

Soil Type and Conditions.

The examination of forty-one cases where the green crop was reported to be either definitely good or definitely poor, suggested that soil texture had little effect. Green manure crops succeeded on gravelly soils just as well as on heavy clay.

When the soils were tested chemically several facts were outstanding. Highly acid soils produced good green crops, and there was no apparent effect of low available potash; but the amount of available phosphate was important, and it appears that legumes are more exacting than cane in this respect.

The average available phosphate content of soils carrying good crops was 110 parts per million, while for the poor crops the value was 37. While the latter figure would, in general, be almost adequate for satisfactory cane crops, it would seem that 60 parts of available phosphate are necessary for satisfactory green crop yields. These conclusions are based on results chiefly from Poona pea crops and were drawn from widely separated cane districts. On soils notably deficient in phosphates it would be distinctly advantageous to broadcast a dressing of superphosphate with the green manure seed. Some cases did not fit in with this generalisation, but doubtless other cultural conditions exert their influence, while the efficiency of the particular root-nodule bacteria in the soils could be expected to show substantial variations.

Weight of Crop.

From time to time sample areas of trial fields have been harvested and the weights of green and dry material determined. Analyses have also been made of the dry crop. Large variations exist from field to field, but the available data suggest that about 12 tons of green or 2½ tons of dry material is an average value for successful crops. When turned into the soil this constitutes quite an appreciable quantity of organic matter. On the basis of the weight of an acre-foot of soil it amounts to 0·2 per cent. of the weight of the soil concerned. Although the total amount of organic matter is not very materially increased, especially as

* In *The Cane Growers' Quarterly Bulletin* for April, 1941.

much of the crop residue is actually lost to the soil by the rapid decomposition which takes place, the very nature of the rotting process results in improvement of the physical properties of the soil. However, the chief benefit of the green crop is its influence on the soil nutrient supply, and in particular the nitrogen gain which a well-nodulated green crop obtains from the atmosphere. This is largely a clear gain in soil fertility. It should be stressed, however, that a crop grown in a soil rich in available nitrogen will simply live on the soil supply and so serve merely as a cover crop.

Composition of Leguminous Crops.

The green crop also serves as a soil preserver, as it is grown during the high rainfall season. It prevents erosion from slopes due to excess run-off, and also absorbs the available phosphate, potash, and other foods, guarding them against leaching until the crop is ploughed in, when they are rapidly returned to circulation. *Dry* green manure tissues contain, on an average—

	Per cent.	lb. per acre.
Nitrogen	2·2 ..	120
Phosphoric acid	0·4 ..	22
Potash	2·0 ..	110

Expressed in terms of common fertilizer materials, these represent—

5½ cwt. sulphate of ammonia.
1 cwt. superphosphate.
1¾ cwt. muriate of potash.

It is estimated that about two-thirds of the nitrogen represents a net gain to the soil, while the remaining plantfoods, though absorbed from the soil, are preserved against loss by leaching. For the largest nitrogen gains through the agency of root-nodule bacteria, farmers should use inoculated seed and sow it soon after the old ratoons have been ploughed out.

It is of interest to compare the weights and composition of cane trash with the above figures. The weight of *dry* trash from a 20-ton cane crop is about 6 tons, containing 0·4 per cent. nitrogen, 0·16 per cent. phosphoric acid, and 0·7 per cent. potash, which is equal in plantfood value to some 52 lb. nitrogen, 22 lb. phosphoric acid, and 90 lb. potash per acre.

TREES ON THE FARM.

Trees serve many important purposes on farming and pastoral country.

Trees are valuable as—

1. Windbreaks and shelter belts.
2. For isolated or scattered shade and shelter.
3. A reserve supply of fodder for periods of drought.
4. Timber and fuel supplies.
5. Screens around dams and tanks to prevent silting up by dust, and undue evaporation of the water.
6. For the prevention of erosion on slopes and along the banks of creeks and rivers.
7. For ornamental plantations in improving the appearance of the home.

Frost Prevention by Orchard Heating.

By Officers of the Fruit Branch.

IN Queensland destructive frosts are not nearly so frequent as in some other States or in other parts of the world. Nevertheless, serious losses are occasioned at times to early-fruiting varieties by late frosts, and though, generally, the expense attached to orchard-heating is too high to be economical, it would at times be well worth the expense of occasional heating in those orchards where late frosts periodically occur.

FROST FORMATION.

With regard to the principles of frost formation, everybody knows that this phenomenon occurs when the temperature falls below 32 deg. Fahrenheit. What is known as a white frost is the accompaniment of a deposit of white ice crystals on exposed surfaces. A black frost is characterised by the absence of white crystals and is usually regarded as being the more severe in the causation of damage to plant life.

During the daytime, the heat from the sun comes to the earth in the form of waves, a method of heat transfer which is known as radiation. By the same process of radiation the earth losses heat continuously both day and night, but during daylight the amount of heat absorbed is greater than that given off into space, and the temperature of the earth becomes higher than that of the air in contact with it. As soon as this occurs, the layer in contact with the earth surface becomes warmer than the air at higher elevations. Heated air is lighter than cold air, and as soon as the air in contact with the earth's surface becomes warmer than that above or surrounding it, it is forced upward, and colder air rushes in to take its place. Circulation is thus established, in which the cool upper air is continually replacing the heated air near the ground. By sunset the air to a height of several hundred feet has been warmed. After sunset no heat is received from the sun, and the earth rapidly cools and becomes colder than the layer of air in contact with it. The surface layer of air in turn becomes colder than the air a few feet above. In this instance, however, the cooled air being heavier than the warmer air higher up, the tendency is on a calm night for the same air to remain in contact with the ground all night. Since air conducts heat very slowly, atmospheric cooling does not extend to great heights, as a result of which the temperature of the air 300 feet above the ground changes but little during the night. Thus, over a flat piece of ground on a clear calm night there is a relatively thin layer of cold air near the ground with a gradual increase of temperature up to an altitude of several hundred feet, above which the air becomes colder the higher one ascends. There is thus formed a sort of atmospheric ceiling, the existence of which is of very great importance in the prevention of frost damage to plants by the creation of artificial heat.

Certain factors influence surface cooling. For instance, wet soil is a good conductor of heat and newly irrigated soil is therefore less susceptible to frost than dry ground. Newly ploughed ground, grass, weeds, &c., are poor conductors, and so tend to increase the severity of the frost. Water has a good capacity for heat, hence the proximity of lakes and rivers will help to reduce the frost. On a slope the coldest air at ground level will tend to drift down hill and make room for warmer air higher up. A slope is therefore protected to some extent

Very small differences in level can make a big difference to frost formation. A wind will stir up the air, mixing cold and warm and thus ensure a higher temperature. The clearer the sky, the greater the likelihood of frost.

PREVENTION OF FROST INJURY.

Various methods have been advanced from time to time as a means of preventing frost injury. The old method was the causation of dense clouds of smoke overlying the area to be protected. The method was known as smudging. The modern method is to heat the cool stratum of air immediately overlying the orchard, so that the temperature does not fall below 32 deg. Fahrenheit, the point at which frosts occur and cause damage.

With regard to the importance of the so-called atmospheric ceiling, if this ceiling did not exist and the air got colder from the ground upwards, as soon as the lower stratum of air was heated it would rise to unlimited heights, and cold air would continually rush in to take its place. With the existence, however, of a body of air above the ground in which the temperature increases up to a height of several hundred feet, the rise of the heated air is checked when it reaches a height at which the air temperature is equal to its own. Having reached this level, its tendency to rise disappears and it spreads sideways, and subsequent supplies of warm air from below will similarly be deflected sideways but at an ever decreasing height. At the same time, the cold air drawn in to replace the heated air at ground level will not be so cold but will already have been partially warmed. Thus an effective rise in temperature will be eventually obtained right down to ground level.

For the purpose of creating heat various fuels have been used, such as wood, coal, coke, kerosene, crude oil, &c. Of these methods, crude oil burned in specially constructed heaters is very efficient. Among the advantages is that in suitable burners many fires can be set going in a short space of time. Many small fires provide a better protection than a few big ones.

When there is a danger of frosts occurring several nights in succession the expense and labour are, of course, increased. In localities where wood is plentiful it is often used, and this is the method most used in Queensland up to the present time. The disadvantages of using wood, however, are the labour involved in obtaining it, as a number of fires are required per acre of orchard; the time occupied in lighting the fires, especially if the wood is wet or damp—and time is an important factor when the alarm bell indicates that there is danger of frost and the fires must be got going as quickly as possible. Coal and coke have been used, but the great drawback here, also, is the time occupied in lighting.

Oil fuel is easy to handle, easy to light, and easy to maintain at an even temperature. If the temperature is raised unnecessarily high, as indicated by the thermometer, some of the burners can be easily extinguished.

TYPES OF HEATER USED.

In Southern States two types of heaters are mainly in use. Firstly, the coke, coal briquettes, or charcoal heaters, which are simple and cheaply constructed of heavy-gauge iron, consisting of two parts, the cylinder with grate which contains the fuel, and the top which fits on the cylinder, comprising a draught cone, stack, and damper. Each

heater is capable of holding approximately 20 lb. of fuel, which burns from four to five hours at a cost of 4½d. to 5d. per heater, varying according to the cost per ton. From forty-five to fifty heaters of this type are required per acre.

Bucket heaters of all kinds burning low-grade oils have been used with unqualified success. Useful burners may be made from 2-gallon or 4-gallon oil or paint drums, usually obtainable from hardware dealers. Dampers, which may be circular or triangular, should be made to fit over the tops of the burners, so that the flame may be regulated and the burning may not be excessive. The wick, which can be made from any old rag or cloth, may be hung on the damper. Lids should be provided so that the heaters can be extinguished at will. Lighting is accomplished by the use of torches which drip burning fuel into the heaters. Such a torch consists of a container with a spout and a wick so placed that the fuel will fall fairly freely, the lighted wick igniting the torch fuel as it flows out. If the buckets are made narrower at the bottom than

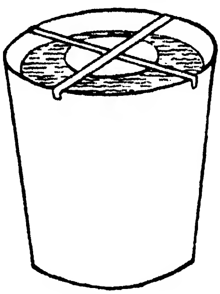


Fig. 1.
Circular Damper.

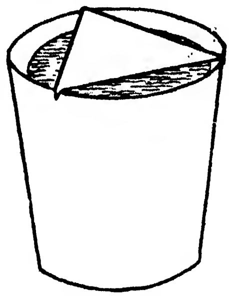


Fig. 2.
Triangular Damper.

Plate 122.

OIL BURNING BUCKET HEATERS.

at the top, they can be stacked inside one another and occupy less space when not in use. No solder joints must be used in making the buckets as the boiling point of oil is higher than the melting point of solder and the solder joints would melt and break.

COST OF HEATING.

Some crops are more easily injured by frost than others. For instance, oranges are injured by a temperature of 30 degrees when the buds are commencing to show colour, whereas apples are not troubled until the thermometer falls to 27 degrees. Knowing the temperature at about which injury is likely to be occasioned, the grower can decide according to the probable number of frosts in a season and the value of his crop whether the cost of heating his particular orchard is justified.

It is estimated that fifty 4-gallon heaters on a 1 acre block, each burning 0·6 gallon of oil per hour, will raise the temperature to a point equal to that of the atmospheric ceiling 25 feet up. Thus, if the temperature at an altitude of 25 feet is 5 degrees higher than at ground level, the temperature of the orchard will be raised 5 degrees. In larger orchards less heaters per acre are required since it is easier to heat a large than a small area. In a 10-acre block the number of heaters may be reduced by 40 per cent.—that is, 300 for 10 acres. With crude oil obtainable at a cost of about 6d. per gallon, the cost would be 3⅗d. per

heater per hour. Heaters can be made for about 4s. each. It would on a particularly cold night probably be necessary to keep them burning for three or four hours until the danger has passed. Once the temperature of the orchard has been raised to the degree required, the dampers can be placed on the heaters and the size of the flame and the fuel consumption reduced to half. This may prove sufficient to maintain the warmer temperature until the danger of damage is over.

SPACING OF HEATERS.

When the number of heaters required is decided upon, suitable spacing must be arranged. A row of heaters should be placed a few yards outside the orchard on the windward side if there is any wind drift, or, if there is higher land above the orchard, a row should be placed along the higher side to guard against cold air drifting in from this direction. It is advisable to place the heaters closer together round the edges of the orchard and space the remainder evenly throughout the trees themselves. If the ground is lower in some parts and consequently more susceptible to injury, the heaters should be placed closer together in such places.

THERMOMETERS.

A thermometer should be placed in the lowest portion of the orchard or the point at which the frost is likely to be most severe. If the orchard is a very large one or the surface irregular, appreciable differences of temperature are likely to be found throughout the orchard and other thermometers should be placed at intervals. The thermometer should be carefully fixed at a height of 4 feet from the ground and midway between heaters so that the lowest temperatures are recorded. Steel-based coloured alcohol thermometers are probably the best to use. They are strong and the alcohol is coloured red so as to be easily readable at night. The cost is about 7s. 6d. each.

ALARM THERMOMETERS.

A simple type of alarm thermometer which will warn the orchardist at his bedside that the temperature is reaching danger point is shown in Plate 123.

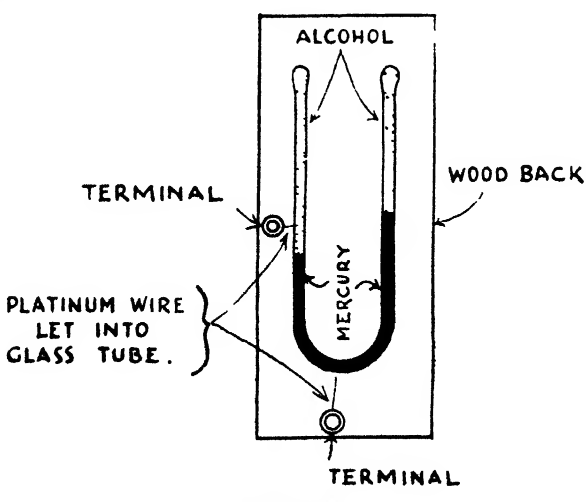


Plate 123.
ALARM THERMOMETER.

As the temperature falls, the alcohol in the left-hand bulb contracts and the mercury moves up to the left-hand side of the tube. At 34 degrees Fahrenheit, or whatever temperature the instrument is made for, the mercury touches the upper patinum wire, thus making electrical contact between the two terminals. The thermometer is connected to a bell, battery and switch, as shown in Plate 124, and at this temperature the bell rings and wakes the orchardist. The bell is stopped by shutting off a switch.

The position of the alarm thermometer is most important and it should be mounted in a manner similar to the ordinary thermometer at the coldest point of the orchard. The alarm should be tested every

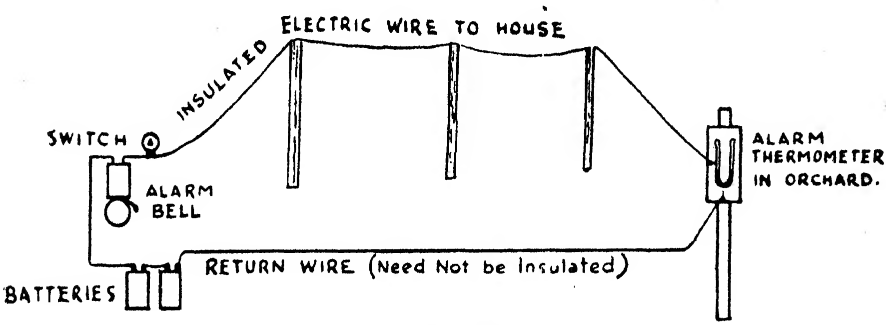


Plate 124.
WIRING OF ALARM BELL.

evening until the danger is over because a broken wire will cause the system to fail. Also if the insulation of the wiring is poor and a leakage of current takes place, the batteries will be run down and will not have enough energy left to ring the bell. If the two wires touch the bell will ring irrespective of the temperature. The system is tested by joining the two terminals of the thermometer with a piece of wire and then switching on. If everything is in order, the bell will ring. The piece of wire joining the terminals is then removed and the switch left on ready for the night. The alarm bell and switch is best placed alongside the orchardist's bed so that it will be sure to wake him.

Methylene Blue (Reductase) Test and Plate Count Test.

A COMPARISON OF 2,304 PARALLEL TESTS.

O. KUDELKA, M.D., Bacteriologist of the Brisbane Milk Board.

THE Methylene Blue (Reductase) Test modified by Wilson measures the time in which 10 millilitres of the milk to be tested decolourise 1 millilitre of a standard methylene blue solution (containing about 1/300,000 part of methylene blue). By inverting the test tube in every half hour an equal distribution of butter-fat and bacteria is achieved and a distinct decision of the state of decolourisation is possible. The change of colour is effected by two main reducing systems, one in the milk itself and the other in the ferments of bacteria in milk. Wilson has pointed out that raw or pasteurised milk never reduces methylene blue under aerobic conditions when bacteria are completely absent. The test can therefore be regarded as significant for the degree of bacterial contamination of milk.

The reduction of methylene blue to the colourless methylene white depends on the number and the activity of bacteria present in the milk. A short reductase time can be caused by a large number of weakly reducing or by a small number of strongly reducing organisms. The bacterial activity and its effect on the quality of milk is, however, the main problem of milk hygiene. The methylene blue test can therefore be regarded as a very suitable and satisfactory milk test. It is simple and reliable and allows a fairly quick detection of low-quality milk However, it does not give information as to the type of organism present and cannot be used for the detection of harmful germs.

The plate count test indicates the number of colonies that develop within forty-eight hours after a suitable medium (milkagar) has been inoculated with a known amount of the milk to be tested. The count is referred to the number of colonies per 1 ml. of milk. Although this test requires the equipment of a bacteriological laboratory, its accuracy is not very great. The bacteria are not equally distributed in milk and sometimes cling together, forming clumps or clusters. Although it is supposed that every colony of the plate has originated from a single bacterium, some of the colonies may have been formed from a clump of many bacteria that were clustered together. On the other hand, some other bacteria may have failed to develop colonies at all. The conclusion from the number of developed colonies to the number of bacteria originally present in milk is therefore only exact to a limit.

Different plates of the same milk may show different counts within certain limits, and the skill and method of the person testing have a marked influence on the result of the test. However, identification of types and detection of harmful germs is easily possible, and certain conclusions as to the probable source of contamination can be made.

Since, therefore, the plate count test is based on the number only, the reductase test on number and action, any comparison of results can only be made by considering this difference.

In the following the results are reported of 2,304 milk examinations which were carried out on raw morning's milk. The milk was sampled three to five hours after milking, at the depots in Brisbane, and the samples were subjected without any delay to the plate count and reductase test simultaneously.

Table (1) shows the actual figures.

TABLE 1.

ABSOLUTE FIGURES, 1939—PLATE COUNTS PER MILLILITRE.

Time of Reduction (Decolourisation).	Under 10,000.	10,000-50,000.	50,000-100,000	100,000-250,000.	250,000-500,000.	500,000-750,000.	750,000-1,000,000.	Over 1,000,000.	Number of Cases.
More than 5½ hours	124	123	15	8	1	..	..	..	271
Less than 5½ hours ..	28	66	12	4	3	..	..	..	113
Less than 5 hours ..	12	48	21	8	3	..	..	..	92
Less than 4½ hours ..	4	34	21	24	7	..	..	..	90
Less than 4 hours ..	2	26	23	17	12	..	..	..	80
Less than 3½ hours ..	2	19	13	28	9	2	1	2	76
Less than 3 hours ..	1	14	11	23	19	5	2	4	79
Less than 2½ hours ..	..	6	5	25	17	9	2	9	73
Less than 2 hours ..	2	5	3	9	8	12	1	20	60
Less than 1½ hours ..	..	1	1	1	6	1	3	26	39
Less than 1 hour ..	..	2	1	2	..	..	2	18	25
Less than 30 minutes	..	..	..	..	..	..	..	13	13
Number of cases ..	175	344	126	149	85	29	11	92	1,011

1940.

Time of Reduction (Decolourisation).	Under 10,000.	10,000-50,000.	50,000-100,000.	100,000-250,000.	250,000-500,000.	500,000-750,000.	750,000-1,000,000.	Over 1,000,000.	Number of Cases.
More than 5½ hours..	242	154	15	6	4	..	..	..	421
Less than 5½ hours ..	38	78	8	6	..	1	..	..	131
Less than 5 hours ..	31	76	10	6	1	..	..	..	124
Less than 4½ hours ..	10	71	30	11	3	..	1	..	126
Less than 4 hours ..	9	48	37	20	7	2	..	..	123
Less than 3½ hours ..	15	24	23	19	..	..	..	1	82
Less than 3 hours ..	..	6	6	28	22	7	2	2	73
Less than 2½ hours ..	..	4	4	12	27	6	3	12	68
Less than 2 hours ..	1	1	..	9	19	3	7	22	62
Less than 1½ hours ..	..	2	..	1	8	2	8	18	39
Less than 1 hour ..	..	..	..	1	3	..	5	28	37
Less than 30 minutes	..	..	..	..	..	..	..	27	27
Number of cases ..	346	464	133	119	94	21	26	100	1,313

To facilitate the comparison the percentage of distribution was worked out by taking as a basis (*a*) the reductase time (Table 2), and (*b*) the plate count (Table 3).

TABLE 2.

1939—PLATE COUNTS PER MILLILITRE.

Reduction Time.	Number of Cases.	Under 10,000.	10,000-50,000.	50,000-100,000.	100,000-250,000.	250,000-500,000.	500,000-750,000.	750,000-1,000,000.	Over 1,000,000	
More than 5½ hours	271	**45.7**	45·3	5·5	2·9	0·4	..	..	..	100
Less than 5½ hours	113	24·8	**58.4**	10·6	3·5	2·7	..	..	..	100
Less than 5 hours	92	13·0	**52.2**	22·8	8·7	3·8	..	..	..	100
Less than 4½ hours	90	4·4	**37.8**	23·3	26·7	7·8	..	..	..	100
Less than 4 hours	80	2·5	**32.5**	28·7	21·3	15·0	..	..	..	100
Less than 3½ hours	76	2·6	25·0	17·2	**36·8**	11·9	2·6	1·3	2·6	100
Less than 3 hours	79	1·3	17·7	13·9	**29.1**	24·1	6·3	2·5	5·1	100
Less than 2½ hours	73	..	8·3	6·8	**34.8**	23·3	12·3	2·7	12·3	100
Less than 2 hours	60	3·4	8·6	5·2	12·1	13·8	20·7	1·7	**34.5**	100
Less than 1½ hours	39	..	2·6	2·6	2·6	15·4	2·6	7·7	**66.6**	100
Less than 1 hour	25	..	8·0	4·0	8·0	..	..	8·0	**72**	100
Less than 30 min.	13	..	..	..	..	..	..	..	**100**	100
	1,011	..	..	..	..	..	..	..	..	..

1940.

Reduction Time.	Number of Cases.	Under 10,000.	10,000-50,000.	50,000-100,000.	100,000-250,000.	250,000-500,000.	500,000-750,000.	750,000-1,000,000.	Over 1,000,000	
More than 5½ hours	421	**57.5**	36·6	3·6	1·4	0·95	..	..	..	100
Less than 5½ hours	131	29·0	**59·5**	6·1	4·6	..	0·8	..	..	100
Less than 5 hours	124	25·5	**61·3**	8·1	4·8	0·8	..	..	..	100
Less than 4½ hours	126	7·9	**56.6**	23·8	8·7	2·3	..	0·7	..	100
Less than 4 hours	123	7·3	**39.0**	30·1	16·3	5·7	1·6	..	..	100
Less than 3½ hours	82	18·3	**29.3**	28·0	23·2	..	..	..	1·2	100
Less than 3 hours	73	..	8·2	8·2	**38.4**	30·2	9·6	2·7	2·7	100
Less than 2½ hours	68	..	5·9	5·9	17·6	**39.7**	8·8	14·4	17·7	100
Less than 2 hours	62	1·6	1·6	..	14·5	30·7	4·8	11·3	**35.5**	100
Less than 1½ hours	39	..	5·1	..	2·6	20·5	5·1	20·5	**46.2**	100
Less than 1 hour	37	..	..	..	2·7	8·1	..	13·5	**75.7**	100
Less than 30 min.	27	..	..	..	..	..	..	..	**100**	100
	1,313	..	..	..	..	..	..	..	..	..

TABLE 3.

1939.

Plate Counts.	Number of Cases.	More than 5½ Hours.	Less than 5½ Hours.	Less than 5 Hours.	Less than 4½ Hours.	Less than 4 Hours.	Less than 3½ Hours.	Less than 3 Hours.	Less. than 2½ Hours.	Less than 2 Hours.	Less than 1½ Hours.	Less than 1 Hour.	Less than 30 Min.	
Under 10,000 ..	175	**70.9**	16·0	6·8	2·1	1·2	1·2	0·6	..	1·2	..	..	..	100
10,000-50,000 ..	344	**35.8**	19·2	14·0	9·9	7·5	5·5	4·0	1·7	1·4	0·3	0·6	..	100
50,000-100,000 ..	126	11·9	9·5	16·7	16·7	**18.3**	10.2	8·7	4·0	2·4	0·8	0·8	..	100
100,000-250,000 ..	149	5·4	2·7	5·4	16·1	11·4	**18.8**	15·4	16·8	6·0	0·7	1·4	..	100
250,000-500,000 ..	85	1·1	3·5	3·5	8·0	14·1	10·6	22·4	**20·0**	9·4	7·1	..	..	100
500,000-750,000 ..	29	..	..	..	..	..	6·9	17·2	31·0	**41.4**	3·4	..	..	100
750,000-1,000,000 ..	11	..	..	..	..	..	9·1	18·2	18·2	9·1	**27.3**	9·1	..	100
More than 1,000,000	92	..	..	..	..	..	2·2	4·4	9·8	22·0	**28.3**	19·6	14·1	100
	1,011	..	..	..	..	..	..	..	..	..	..	..	..	

1940.

Plate Counts.	Number of Cases.	More than 5½ Hours.	Less than 5½ Hours.	Less than 5 Hours.	Less. than 4½ Hours.	Less than 4 Hours.	Less than 3½ Hours.	Less than 3 Hours.	Less than 2½ Hours.	Less than 2 Hours.	Less than 1½ Hours.	Less than 1 Hour.	Less than 30 Min.	
Under 10,000 ..	346	**69.9**	11·0	9·0	2·9	2·6	4·3	..	..	0·3	..	..	..	100
10,000-50,000 ..	464	**33.2**	16·8	16·4	15·3	10·3	5·2	1·3	0·9	0·2	0·4	..	..	100
50,000-100,000 ..	133	11·3	6·0	8·0	22·5	**27.8**	17·3	4·5	3·0	..	..	..	..	100
100,000-250,000 ..	119	5·0	5·0	5·0	9·2	16·8	16·0	**23.5**	10·0	7·6	0·8	0·8	..	100
250,000-500,000 ..	94	4·3	..	1·1	3·3	7·7	..	23·4	**29.0**	20·7	8·7	3·3	..	100
500,000-750,000 ..	21	..	4·8	..	..	9·5	..	**33.3**	28·6	14·3	9·5	..	..	100
750,000-1,000,000 ..	26	..	..	..	3·8	..	..	7·7	11·5	26·9	**30.8**	19·2	..	100
More than 1,000,000	110	..	..	..	..	..	0·9	1·8	10.9	20·0	16·4	**25.5**	24·5	100
	1,313	..	..	..	..	..	..	..	..	..	..	..	..	

In general, there is a good agreement of both tests.

Milk with a good plate count has also a long reductase time and vice versa. The latter seems to give more uniform results than the former, but it has to be remembered that too many subgroups in milk tests provide only pseudo-accuracy.

For practical purposes the distinction of very good, fairly good, not satisfactory, and very unsatisfactory milk is sufficient. It can be seen that both tests correspond exactly in regard to very good and very bad milk. Those with more than five and a-half hours of reductase time have in more than 90 per cent. counts below 50,000 per ml. 100 per cent. of all milks with the extremely low reductase time of less than thirty minutes show counts over 1,000,000 per ml.

The middle groups of both tests have but a common tendency. It seems impossible to co-ordinate exactly a certain reductase time to a certain plate count.

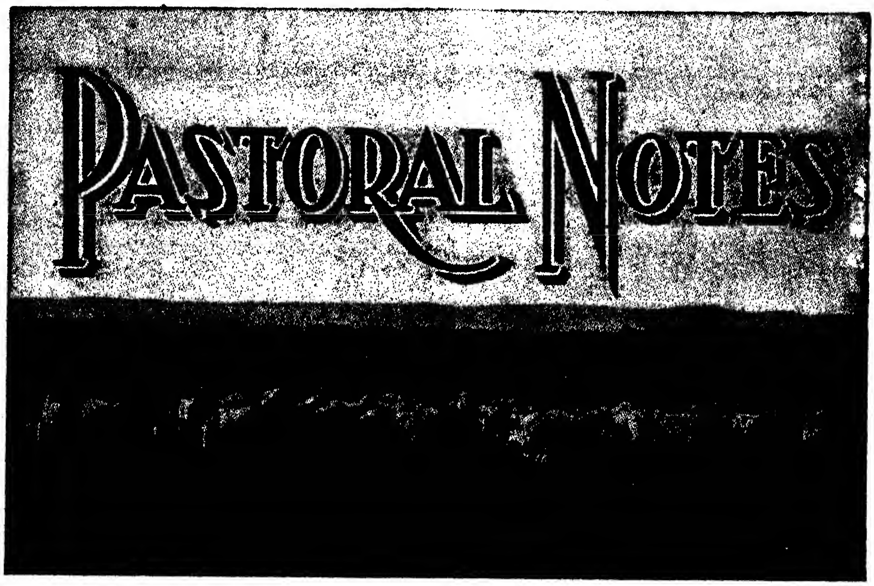
The different activity of the various bacterial types will always cause a variation of the reductase time, which is independent from the variation caused by different numbers.

For grading milk either of both tests can be used satisfactorily. Being simpler and shorter the methylene blue test seems preferable for the most practical purposes.

Plate 125.

NEARLY FIFTY YEARS AGO.—The Staff of the Department of Agriculture and Stock, 1895.

Left to right.—R. Wilson (afterwards Under Secretary), S. S. Hooper (who became Chief Accountant), E. Scriven (afterwards Under Secretary), Peter McLean (Under Secretary), Henry Tryon (formerly Chief Entomologist), A. H. Jones (afterwards O/C Commercial Section), T. Voltemann, John Liverseed (afterwards Manager of Hermitage State Farm, Warwick).



Fat Lamb Sires.

MANY sheep owners realise both the advantage to be gained by improving their stock and the influence exerted by the sires on the progeny. Much more consideration should, however, be given to these important factors in the management of the flock. Poor quality sheep require just as much time and attention as those producing a greater quantity of better quality wool. On a holding where sheep can be bred successfully, 1,000 average breeding ewes may cut approximately 7 lb. per head. Assuming that 20 cheap merino rams cutting 12 lb. per head are used and that wool prices are 15d. per lb. for ewe wool and 12d. per lb. for ram wool, the income from the sale of wool will be £449 10s.

If better quality rams are used, they should cut 18 lb. each. The returns from them and the 1,000 ewes would be £455 10s., if the ram's wool is valued on the same basis as that of the low producers.

The influence of the better rams should increase the wool production of the progeny in four years to an average of 10 lb. per head, and the quality of the wool would be improved and bring higher returns, say, 16d. per lb. The yearly income would then be approximately £685.

Thus the additional expenditure on high-class rams is more than compensated for by an increased return to the grazier. The standard of the whole flock has been raised considerably and improvement can similarly be continued until stud standard is reached.

The influence of breed and type in fat lamb production is equally important. In fat lamb production, the lambs must develop quickly and combine plumpness with a symmetrical form at an early age. Feeding on suitable pastures or crops is essential no matter what breed is used; but carcass quality is largely dependent on the use of the right type of sires. A group of lambs which are the progeny of a pure bred shapely ram capable of transmitting the early maturing plumpness to the lamb can usually be sold at an age of from eleven to twelve weeks. The progeny of an inferior sire of the same breed may take three or four weeks longer to develop into prime condition, and, even when fat, they cannot be classed as prime sucker lambs for they are too old to carry the sucker bloom. The additional expense and trouble of having to feed and care for the slow maturing lambs for the three or four extra weeks is a further disadvantage.

Consumers at the present time are enquiring for small plump joints of lamb and the first step in meeting this demand should be the introduction of purebred rams.

OVERGRAZING OF PASTURES.

That a large proportion of the most productive pastures of the State, coastal as well as inland, are overstocked is an undeniable fact. Unfortunately, too, the recent drought in the coastal areas has emphasised the harmful results of overstocking. The farms which were very much overstocked before the drought had the heaviest losses through its incidence. Many farmers and pastoralists are fully conscious of the bad effects of overstocking on pastures, and a large proportion of them insist on a moderate and judicious stocking of their holdings. As a consequence they are frequently very successful in good seasons and are the last to be affected by adverse seasons.

In a large proportion of cases, overstocking is due to economic conditions. Landholders often feel compelled to stock their properties to the limit during favourable seasons. Any general attack on the problem of overstocking would, therefore, inevitably involve financial considerations. It is, however, invariably advantageous, even from the economic viewpoint, not to overtax the productive capacity of the pastures.

Pastures which are not heavily stocked usually make rapid growth in the late summer and autumn, when the rainfall is sufficient. This is notably the case in some of the best paspalum pastures on the coast. This excess growth of grass is not eaten by stock, and when dry serves to protect the younger growth of grass from frost during the winter. With the approach of spring the younger growth of grass makes rapid headway, and forms a luscious pasture for stock. The general fertility of the soil of a pasture maintained in this way deteriorates much less rapidly than that of an overstocked pasture. The excess grass as it lodges and rots is added to the soil, and augments its organic constituents. Although this surplus late summer grass has a comparatively low feeding value on account of its low protein content, it has a high manurial value. It is composed very largely of organic matter which after decomposition has a marked reducing effect on essential soil minerals such as iron. It is due to this reducing effect of these organic constituents that the iron in the upper layers of the soil becomes soluble and available to pasture plants, fruit trees, and other economic crops.

MEATWORKS BY-PRODUCTS.

Meatworks by-products are all of organic origin, and vary in composition with the part or parts of the animal used in their preparation.

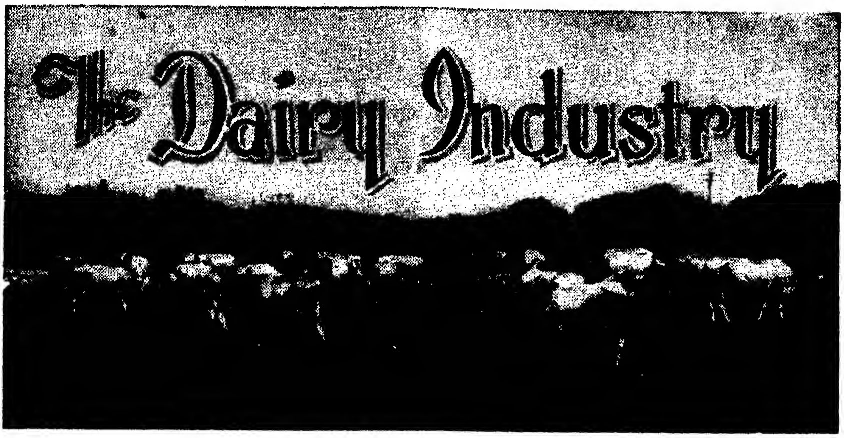
Blood is used either as a foodstuff (blood meal) or as a fertilizer (dried blood), depending on the quality of the manufactured product. Blood meal is not available on the Queensland market and requires no discussion here. Dried blood contains 81 per cent. crude protein (nitrogen 13 per cent.) and other organic matter, plus moisture 19 per cent. It is a widely-used nitrogenous fertilizer, comparable in many respects with sulphate of ammonia in the rapidity with which the nitrogen is available to the plant.

Bone is finely ground in the preparation of bone flour, bone meal, and bone dust. An average quality bone dust contains crude protein 22 per cent. (3½ per cent. of nitrogen), tricalcic phosphate 50 per cent. (23 per cent. phosphoric acid), and other organic matter plus moisture, 28 per cent. Bone dust is a slow-acting phosphatic manure. The more highly-refined products find an outlet as a constituent in many stock licks, which are valuable for stock grazing on phosphate deficient soils.

Waste flesh is the basis of meat meal, the dried residues being finely ground. It invariably contains a certain amount of bone. Meat meal (crude protein 63 per cent.), like blood meal, is an excellent protein concentrate for stock and the available supplies are readily absorbed on the Queensland market. It also contains fat. When used for fertilizer purposes, the fat is first extracted during preparation.

Meatworks manure is a mixed product containing blood, bone, and waste flesh. It contains approximately 3 to 6 per cent. nitrogen and 14 to 23 per cent. phosphoric acid, and is widely used in the State. It should be noted that as the nitrogen increases the phosphoric acid decreases, and *vice versa*.

All bone flour, bone meal, and meat meal products used for feeding animals must be subjected to a steam heat at a temperature of not less than 250 deg. F., equal to an indicated steam pressure of 30 lb. per square inch, for at least two hours during the manufacturing process. They must be prepared only from animals slaughtered for human consumption.



Steam Sterilization in the Dairy.

RESEARCH in many countries has demonstrated that the most prolific source of contamination of milk and cream is the utensils used in the dairy.

Thousands of tests carried out in Queensland in the course of the past few years have revealed that under sub-tropical dairying conditions with the extensive use of the milking machine—always difficult to maintain in a sanitary condition—utensils are of even greater import than in countries with more temperate climate. Because of this special problem, steam sterilization of mechanical milking plants is now compulsory under "*The Dairy Produce Act.*" Because of the diversity of opinion as to the merits of different cleansing and sterilizing procedures, extensive investigations were made and only after the results had clearly shown the inferiority of milk and cream produced on farms equipped with milking machines was the installation of a steam sterilizer made compulsory. It is sometimes suggested that "scalding" is as effective as steam for sterilizing. Certainly the small dairyman may achieve consistently good results by the use of boiling water, but "scalding" temperatures have been found, in the course of investigations, to vary from 130 degrees Fahr. (little better than luke warm) to actual boiling point. Under everyday conditions, however, "scalding"—i.e., pouring hot water from vessel to vessel—even in the hands of a careful supplier cannot be regarded as an effective substitute for steam. To be really effective, utensils should be completely immersed in boiling water—an almost impracticable requirement for milking machine parts.

Remarkable bacteriological results have been obtained with machine-produced milk on farms applying steam sterilization in combination with other approved practices. The efficiency of the procedure was convincingly demonstrated in a field investigation on the Darling Downs some months ago. This survey, covering 72 farms, of which about one-third were equipped with sterilizers, showed that the quality of the milk produced, in accordance with the production methods classed as follows, varied in this order:—

(1) Milk produced with the use of milking machines and equipped with steam sterilizers, 21 farms—of the 198 samples examined, 65.7 per cent. were of satisfactory quality.

(2) Milk produced by hand-milking (steam sterilization not compulsory), 27 farms—of the 253 samples examined, 42 per cent. were of satisfactory quality.

(3) Milk produced with the use of milking machines and not equipped with steam sterilizers (ordinary 12-gallon coppers were used), 24 farms—only 25.7 per cent. of the 363 samples examined were of satisfactory quality.

It should be emphasised that although steam sterilization alone cannot be expected to solve all the problems associated with the production of a choice quality

cream, it will almost certainly be successful if combined with methods of minimising the contamination from other sources besides the utensils. The salient points which must receive attention are:—

(1) Keeping buildings and equipment clean and free from dust.

(2) Rejection of foremilk.

(3) Washing of udders and milkers' hands.

(4) Thorough cleansing, immediately after milking of all utensils in the approved way, and washing of milking machines according to recommended procedures (sterilization is only complementary to thorough washing).

(5) Storage of washed and sterilized utensils away from a contaminating atmosphere.

(6) Keeping milk or cream as cool as possible and away from dusty yards, and other sources of contamination.

Finally, there is the important economic aspect of steam sterilization. As a practice of the greatest importance in the production of choice quality cream, not only does it increase the producer's pay cheque, but contributes materially to the raising of the quality of the State's butter output.

OILING THE SEPARATOR.

Before the separator is used it should be seen that the sight feed lubricator is working satisfactorily. It is absolutely necessary for the machine to receive the correct flow of oil from the lubricator before the separation process begins, otherwise the spindle—one of the most expensive parts of the machine—will show signs of wear long before it is due. Ten drops of oil a minute is a satisfactory adjustment to make on the lubricator. Any increase in this number of drops will not help in the lubrication, although the oil will not go to waste, for it drops into the reservoir at the bottom of the machine.

As soon as separating is finished, the lubricator should be shut off to prevent any more oil from dropping into the machine.

It is advisable to form a habit of cleaning the working parts—the parts that have to be oiled—at the beginning of every month. Take the back cover off the machine, drain out the oil, put in a cup of kerosene or petrol and give the machine a good turn, so that all the moving parts will be thoroughly cleansed. Drain off the kerosene or petrol in the same way as the oil, then replace it with clean, fresh oil, turn the machine again, so as to distribute the oil over the parts, then stop the machine and drain again. This will leave the separator in a thoroughly clean condition, ready to receive fresh oil that will give 100 per cent. lubrication.

Another important point to remember about separator lubrication is that the particular type of oil used must be suitable for high-speed lubrication. Cheap, thick oil should not be used as it may reduce very considerably the efficiency of the separator.

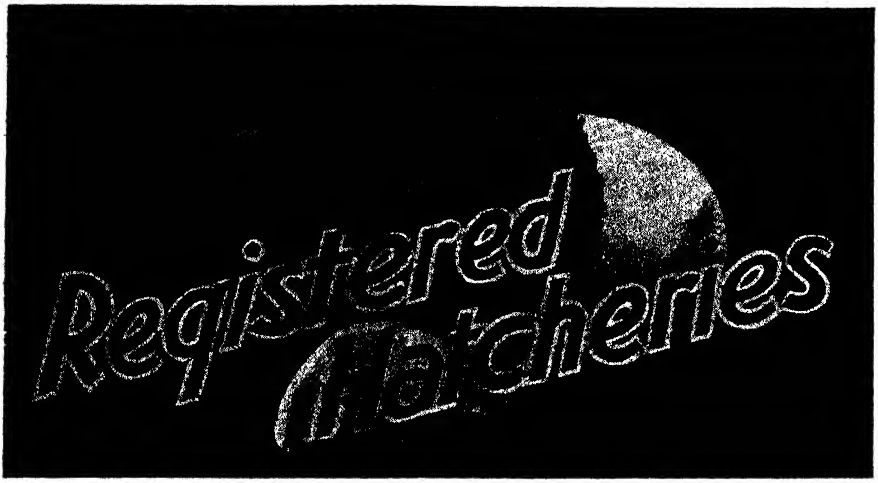
The whole of the cleaning-out and renewing of the oil can be done well within half an hour, and the time spent will be more than repaid.

THE DAIRY FARM.

Large paddocks on a dairy farm are not economical. If practicable, the farm should be subdivided into a number of small paddocks which allows for each to be grazed in turn, and then spelled for a period to enable the paddock to recover. Large paddocks often mean fodder wastage, as cattle roam all over the area, eating out the choice grasses and fouling the remainder, making them unfit for food.

A lot of waste results from faulty management of good pastures by stocking too heavily, which means, of course, that good grasses are eaten up quickly. If the paddock is spelled for a reasonable period, the pasture gets a chance to recover and the grasses have time to seed.

Unwise feeding methods constitute a prolific source of waste. It is necessary to balance the ration, so that there shall be no waste or loss in production through feeding an excess of one food constituent at the expense of another.



Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
W. T. Burden, 44 Drayton road, Toowoomba	Harristown ..	White Leghorns, Australorps, and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca.. ..	White Leghorns and Australorps
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, Rhode Island Reds and Whites
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds
F. E. Hills, Sims road, Bundaberg	Littlemore Poultry Farm	White Leghorns, Australorps, Rhode Island Reds, and White Wyandottes
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas

Name and Address.	Name of Hatchery.	Breeds Kept.
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington ..	Australorps and Rhode Island Reds
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, Junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
A. E. Mengel, 181 Campbell street West Toowoomba	Glenmore ..	White Leghorns, Black Leghorns, Brown Leghorns, Anconas, Australorps and Rhode Island Reds
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Coopers Plains	Norups	White Leghorns and Australorps
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah.. ..	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Witty, Boundary road, Kuraby	Witty's ..	White Leghorns and Anconas
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

GREEN FEED FOR FOWLS.

If fowls are deprived of green feed the most serious deficiency which is likely to occur is that of vitamin A. This vitamin is one of the "fat soluble" group; that is, it is present in high concentration in animal fats. But it may be, and customarily is, supplied by the feeding of greenstuff in which is a substance named carotine. This substance is transformed into the true vitamin A by the liver of the animal body and is stored there in relatively large quantities.

The absence of vitamin A is liable to produce very serious effects on poultry, because when supplies of this substance are inadequate the birds are more liable to bacterial infection. Consequently, a conjunctivitis—that is, an inflammatory condition of the eye—first appears and progresses until the eye has the appearance of an abscess. Further, there is usually a moderate mortality, and on post-mortem examination characteristic abnormalities are seen. Most marked is the presence in the mouth and throat of pustules and ulcers, which can be seen when these parts are opened up carefully. Another characteristic alteration, which is more difficult to detect, occurs in the kidney. Fine white lines may be noticed running through the tissue of that organ. This change is brought about by the deposition of substances called urates, which are excreted from the body by the kidneys.

The occurrence of this disease may be prevented by the feeding of adequate greenstuff, but it is realised that this may be difficult and expensive at the present time.

Additional foods rich in vitamin A are milk and milk by-products, yellow maize, and cod liver oil.

A cheap and convenient method of supplying vitamin A is to feed a goodly proportion of maize or maize meal to poultry.

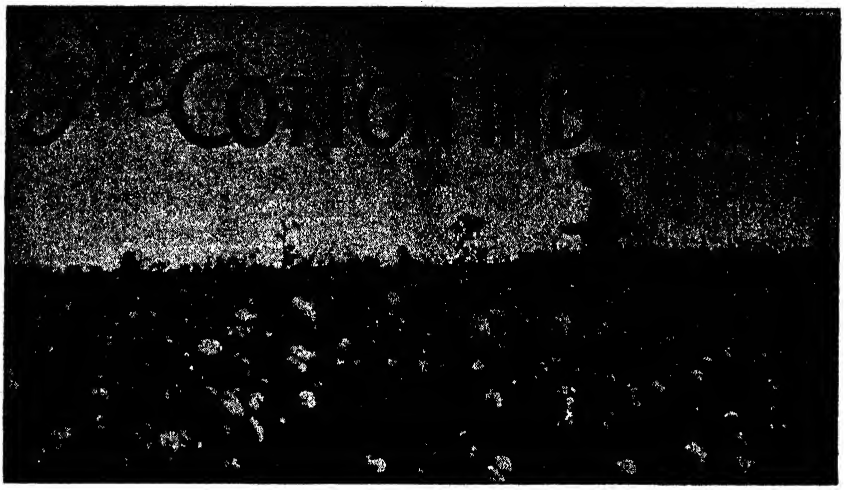
MILK IN THE POULTRY PEN.

Skim milk is an excellent poultry food, and if fowls are given all the skim milk they can drink, and even if fed on nothing else but grain, they will continue to lay well.

Farmers generally appreciate the necessity of efficient feeding and, to give their fowls the necessary amount of protein, use one or other of the prepared mashes. These mashes are usually fed with grain, the birds being given an equal quantity of each. In these circumstances a sufficient amount of protein is made available to the birds.

The farmer who has skim milk to give his birds may therefore depart somewhat from his ordinary practice for skim milk is a protein-rich food; but how far he may do so depends on the quantity of skim milk available. If the birds are given only say half the skim milk they will consume half the quantity of mash that is usually fed should be supplied and the grain increased by about 50 per cent.

It will generally be found a sound policy when milk mash and grain are being fed to the flock to give the birds all the grain that they will consume and not force them to eat given quantities of mash. This policy will largely enable the birds to balance their own ration.



Don'ts for Cotton Growers.

DON'T grow cotton by methods that are not suitable for the production of a satisfactory yield under the wide range of conditions which may be experienced in most of the cotton-growing districts. The following recommendations are offered for growing cotton under only rainfall conditions and are based on the results which have been obtained in this State both in investigations conducted over a series of years, and in a large number of commercial crops grown each season.

1. Don't grow cotton on old cultivations if it can be avoided. If it is necessary to use old cultivations, the cotton should follow some fodder crop that has matured in time to allow of the ploughing for the cotton crop to be done prior to the occurrence of the winter rainfall.

2. Don't grow cotton following either lucerne or cowpea. These crops may build up the supply of nitrogen in the soil sufficiently to cause rank development of the cotton plant with a resultant partial crop failure, particularly when planting is delayed. The results obtained over several seasons have generally indicated that the best yields may be expected where cotton is grown on land in the first, second or third season following the ploughing of either native grassland or sown areas of Rhodes grass.

3. Don't grow cotton following cotton, except on land in the second and third season after the breaking up of grassland. A cotton crop will exhaust most of the subsoil moisture during a dry autumn, thus handicapping the growth of a following cotton crop if on an old cultivation, unless very efficient and timely rainfall is experienced throughout the growing period of the latter crop. Land in the second or third season after the breaking up of grassland is usually of sufficiently open structure to trap efficiently the rainfall experienced in the early winter prior to the ploughing out of that season's cotton crop. Such ploughing operations should be completed, however, by mid-July to ensure of the fullest efficiency being obtained in the trapping of the late winter and spring rains. The rainfall during the growing period of the following

cotton crop will also be trapped sufficiently in most seasons to promote satisfactory crop development on such cultivations if the winter rainfall has provided ample subsoil moisture.

4. Don't cross plough land on which cotton is to follow cotton, if a satisfactory turn under of all grass, weed, and trash present is obtained with the first ploughing. Where a suitable first ploughing is obtained the final preparation of the seed bed can be carried out efficiently in most seasons by the use of either a disc harrow or a weighted spike tooth harrow. When a sufficiently wet period is experienced in late winter to compact the soils, it may be necessary to cross plough early in the spring to warm up the soils and to bring the surface to a suitable tilth, in which case only a shallow ploughing is advisable.

5. Don't delay ploughing grassland until late in the winter. The best results may be expected where the ploughing is done in April or May to prevent the grass using the moisture stored in the subsoils as a result of the late summer rains. The early ploughing will also leave the surface soil in an open condition that will efficiently trap the winter rains experienced.

6. Don't delay the cross ploughing of ploughed grassland, if this operation is necessary, until late in the spring. Much loss of moisture in the ploughed soil will result if ploughing is done then in an ordinary season, whereas, if the cross ploughing is done not later than mid-July, there is definite possibility in most districts of sufficient rainfall being experienced to moisten the ploughed soils thoroughly to the subsoil prior to the occurrence of the planting rains. On most soils with ample subsoil moisture, a stand of cotton plants may be obtained and maintained on surprisingly light rainfall during the late spring months. An early start of the cotton crop may thus be accomplished in some seasons in which the conditions would be unfavourable for planting on late ploughed areas.

7. Don't under estimate the value of obtaining early a stand of well established cotton plants in most of the districts suitable for cotton growing. Over a series of years it has been shown that crops resulting from plantings in late September to the end of October in the Central District, and from mid-October to mid-November in the southern districts, may be expected to produce better yields than later planted crops. In the areas around Mackay and in the districts north of there, planting towards the end of the wet season appears to produce better yields of cotton of good quality than do plantings made prior to the occurrence of the wet season.

8. Don't plough up and down a slope or even in a straight line across it. Investigations have shown that ploughing on the level contour across the slope of newly-broken grassland prevents run off of all rain amounting up to 1 inch per fall.

9. Don't plough deeper than 6 inches when preparing a seed bed for a cotton crop. No apparent advantages have been gained where deeper ploughings have been tried. If cotton is to follow cotton, ploughings made deeper than 6 inches may prevent obtaining an early stand in the following cotton crop when insufficient rainfall is experienced to wet the deeply-ploughed seed bed thoroughly to the subsoil.

10. Don't make the surface of the seed bed so fine that early storm rains will compact it to such an extent that much of the subsequent

rainfall will be lost through run off. Such run off on slopes may cause a severe loss of surface soil which will result in a further reduction in the absorption of the rainfall experienced that season.

11. Don't grow cotton on deep sandy soils. The red scrub soils, particularly on old cultivations, also frequently fail to produce satisfactory yields of cotton. The general experiences indicate that the loams and clay loams overlying a clay subsoil at a depth of 12 to 36 inches are the most suitable for obtaining satisfactory yields of cotton under a range of climatic conditions.

12. Don't change to another variety because a poor yield is obtained, particularly if the variety grown has produced satisfactorily on the same soil type in previous seasons. Contact the district field officer of the Department of Agriculture and Stock, or the head office of the Department at Brisbane, regarding the suitability of the variety for the soil type on which it has been grown. Also advise regarding the cultural methods being used. Changing to another variety because a poor yield has been produced may prevent faulty cultural methods being detected.

13. Don't reduce the planting rate per acre below that recommended, i.e., 20 lb. of fuzzy seed and 15 lb. delinted seed for cultivations, and 10 lb. delinted seed for the new burns of scrub areas. A poor stand seriously handicaps obtaining good yields.

14. Don't plant deeper than 2½ inches, or shallower than 1½ inches.

15. Don't plant in the dry soil if it can be avoided. It is advisable to have sufficient equipment to enable planting to be completed promptly after the planting rain. When this is not practicable, as in the case of large acreages, plant in the dry only the acreage that cannot be planted within three days after the occurrence of the planting rain.

Plate 126.

DON'T DELAY THE FIRST CULTIVATION, WHICH SHOULD BE MADE WHEN THE COTTON SEEDLINGS ARE 2 TO 3 INCHES TALL.

16. Don't plant delinted seed in the dry soil prior to the occurrence of a planting rain. A light rain may be experienced after the planting which will be just sufficient to start germination of the seed, and in the event of further rain not being experienced soon afterwards, rotting of the seed will result. Generally, if sufficient rain occurs to germinate fuzzy seed planted in dry soil, there will be enough moisture in the soil to maintain the resultant seedlings if there has been ample storage of subsoil moisture prior to the planting period. Using delinted seed after a satisfactory planting rain has occurred is definitely advisable, however, for more even distribution of the seed is obtained in the planting operations and a quicker stand of seedlings results than where fuzzy seed is planted.

17. Don't space the rows wider apart than 4½ feet or narrower than 3½ feet. Use 4½ feet spaces on the fertile soils capable of producing rank growth of plant. Reduce the row spacings to 3½ feet, proportionately to the height of plant that may be generally expected, on the soils which do not produce rank growths.

18. Don't neglect early cultivation of the cotton crop. An efficient cultivation made when the cotton plants are 2 to 3 inches tall removes any grass and weed seedlings present more thoroughly than when the first cultivation is delayed until the cotton plants are 5 to 6 inches tall, and all grass and weed growths are well established. Undoubtedly an early cultivation not only reduces the amount of hand labour and cultivation required later in the season, but the early eradication of weed growth also prevents the cotton plants being robbed of considerable supplies of moisture, which would be of marked value during a dry period in the late spring and early summer. This is a very important point that is overlooked by many cotton growers. An additional benefit obtained by the early destruction of weed growth is the reduction effected in the number of insect pests which begin their attacks in the cotton fields on certain weeds when they are present.

19. Don't eliminate the thinning operations. Undoubtedly serious loss of yield and reduction in the quality of the cotton produced, results where the plants are not sufficiently spaced out. Generally speaking, a spacing from 12 to 18 inches appears to be the most suitable in the main cotton-growing districts for soils producing plants of an open habit of growth, while 18 to 24 inches are more satisfactory for either where tall rank growth may be expected or the districts of lighter rainfall where the wider spacings may provide more moisture for the plant during conditions of stress.

20. Don't delay the thinning operations until the plants are too tall to allow of efficient and economical thinning being done. The best height at which to thin is when the plants range from 6 to 8 inches tall. Better yields result from this height of thinning as compared to thinnings done when the plants are either shorter or taller than these heights.

21. Don't allow the crop to become weedy after the thinning operations are performed. A cultivation should be given right after thinning to establish a mulch and to work soil to the cotton plants. With each later cultivation more soil should be worked to the plants to smother weed seedlings germinating in the row and also to brace the bottom of the plants to prevent their being blown over when the soil is wet.

22. Don't neglect to examine the cotton crop frequently during the early period of its growth. The timely discovery of an attack by some of the insect pests which destroy cotton seedlings, and the immediate application of recommended methods of combating such pests will prevent the considerable loss of stand that may otherwise occur in some seasons.

23. Don't start the picking operations before there is ample cotton open to allow of good picking "tallies" being obtained.

24. Don't pick cotton that is either damp from rainfall or is "green," as cotton is called that has not been thoroughly dried out following the opening of the boll. The fibres of cotton in either condition are cut and twisted badly in the ginning operations, thereby seriously reducing their value.

25. Don't leave the cotton exposed to the weather long enough to affect its quality. Cotton that is left unpicked for several weeks loses the bright colour that is required in the upper grades of lint cotton.

26. Don't include weed seeds or an appreciable amount of leaf and trash when picking cotton. When cotton containing foreign matter of this nature is packed into a container, the leaf, &c., is pressed into the fibres so tightly that it is difficult to extract, especially if the cotton is even slightly damp when packed.

27. Don't harvest good cotton by the snapping method. Snapping, as the process of removing together the open burr and seed cotton is called, is of definite value in harvesting cotton of low grade at the end of the season. The snapping of cotton of good quality, however, markedly lowers its value owing to the excessive admixture of burr and trash with the seed cotton, much of which cannot be removed in the ginning operations.

Plate 127.

DON'T NEGLECT THE LATE CULTIVATION OF A COTTON CROP.—Cultivation should be continued until the passage of the team and machine causes serious breakage of the plants.

28. Don't pack several grades of seed cotton in the one container. The cotton is graded on the basis of the lowest grade contained in the wool pack or chaff bag.

29. Don't delay until late in the winter, where cotton is to follow cotton, the cutting and burning of the cotton stalks in the endeavour to harvest all of the top bolls. The gain obtained in the following cotton brought about by ploughing out the previous plants not later than mid-July, will generally considerably exceed the value of the low-grade cotton harvested from the last of the top bolls of the former crop.

30. Don't leave the old cotton plants standing in the field where the land is not to be planted to cotton again. Standover cotton is frequently a breeding centre for numerous insect pests which may seriously damage the next season's cotton crop. As soon as harvesting is completed, graze the old cotton crop with cattle to remove any unpicked bolls. The remaining plants should then be cut and burned, following on which the land should be ploughed to destroy any insect life or weed and grass growth present.

Cotton is a war-time commodity that is required in appreciably greater quantity than is now being produced in Australia. Every farmer who has soil suitable for producing a satisfactory crop of cotton should therefore grow as much acreage of cotton as he can take care of properly. In order to achieve efficient and economical production of the crop, it is strongly recommended that the above suggestions be carefully followed.

QUEENSLAND SHOW DATES FOR 1941.

June.

Wowan Bushman's Carnival ... 6th
Maryborough ... Postponed
Lowood ... 6th and 7th
Childers Patriotic Carnival 9th and 10th
Boonah ... 11th and 12th
Bundaberg ... 12th to 14th
Gin Gin Horse Show and Carnival 16th and 17th
Gladstone ... 18th and 19th
Rockhampton ... 24th to 28th
Toogoolawah ... 27th and 28th

July.

Mackay ... 1st to 3rd
Proserpine ... 4th and 5th
Bowen ... 9th and 10th
Charters Towers ... 10th to 12th
Nambour ... 10th to 12th
Ayr ... 11th and 12th
Townsville ... 15th to 17th
Laidley ... 16th and 17th
Rosewood ... 18th and 19th
Ingham ... 18th and 19th
Cleveland ... 18th and 19th
Cairns ... 22nd to 24th
Gatton ... 23rd and 24th
Innisfail ... 25th and 26th
Atherton ... 29th and 30th
Crow's Nest ... 30th and 31st

August.

Pine Rivers ... 1st and 2nd
Home Hill ... 1st and 2nd
Royal National, Brisbane 11th to 16th

September.

Imbil ... 5th and 6th
Canungra ... 6th
Pomona ... 12th and 13th
Rocklea ... 13th
Beenleigh ... 19th and 20th

Agricultural Notes

Winter Preparation of Land for Maize.

TO get the best results maize requires a good soil, in which a plentiful supply of plant food is available, a condition which can only be brought about by an early and thorough preparation of the land before planting, attention to the cultivation of the crop itself, and to the eradication of young weeds during its early growth.

The land should be ploughed to a depth of at least 9 inches during the winter and allowed to lie in the rough until the early spring. The action of the frost and the rain will improve the texture of the soil and will leave it in a mellow condition. In the early spring the land should receive a second ploughing, which, if possible, should be a cross ploughing. This should not be so deep as the first ploughing, and should be immediately followed by a harrowing and cross harrowing to work the surface soil into a fine tilth.

If a crop of weeds is turned under during the second ploughing, planting should not be carried out for at least a few weeks to allow decomposition to take place. On land which is not too heavy and moist, rolling is desirable, as it consolidates the soil and helps to make a good firm seedbed. Rolling should always be followed by a light harrowing.

Preparation of Seedbeds.—The preparation of the seedbed is one of the most important points in the production of maize, and no amount of after cultivation will undo the damage that has been caused by planting in a badly prepared piece of land.

One has only to see the difference, not only in the growth but in the colour of the foliage also, between a crop grown on thoroughly prepared and another on hastily prepared land, to realise how great the effect is.

Give the young crop a chance to become well established in a well prepared seedbed—in which the young plants will not have to battle with a host of weeds—and the increased return will more than compensate for the extra time and labour spent.

Time to Plant.—The best time to plant will naturally vary in different districts. In districts which have a long growing season and a comparatively regular rainfall, planting can be carried out whenever weather conditions are suitable, from August to late December.

Two very important points are—firstly, to choose a variety which is suitable for the district; and, secondly, to try and have the crops tasselling during periods in which rain can usually be expected. Maize must have moist conditions during tasselling, and if hot, dry winds occur during this period, the pollen is shed too early and fertilization cannot take place.

Seed should be sown in drills spaced 3 ft. 6 in. to 4 ft. apart. The wider spacing is essential for the tall-growing, late-maturing varieties. As a general rule single spacing in the rows gives the best results, the grains being dropped singly, with a distance of approximately 12 in. between the grains for the quick maturing varieties, and from 15 to 18 in. for the late-maturing varieties.

From 9 lb. to 12 lb. of seed is sufficient to plant an acre when sown in this manner.

The seed drill is the most satisfactory implement for sowing maize, as it ensures a good even spacing, and no loss of moisture occurs during planting, as is often the case where furrows have to be opened up for hand planting.

GET SOUND SORGHUM SEED.

The growing interest in sorghums for green fodder, grain and silage is apparent to a marked degree in the present stage of development of the Western Downs and Maranoa. In view of the large acreage which will probably be sown in those districts during the forthcoming season, the attention of all intending growers is called to the absolute necessity for ensuring that their seed is sound in respect of germination capacity.

It will be readily understood that if at the next sowing period there is faulty germination of the seed, the resultant dislocation of planting may well be fatal to success, and the delay caused by the necessity for replanting may result in the crop missing the most favourable conditions for growth. For these reasons, all growers are strongly urged to insure against loss by adopting the following suggestions:—

(1) If planting has to be done late in the season, all crops intended for seed should be sown before those to be used for other purposes.

(2) When purchasing, insist on getting seed which has been tested for germination capacity by the Department of Agriculture and Stock, or send samples for testing direct to the Department.

Samples should be 4 oz. in weight and addressed—

The Officer in Charge,
Seed Testing Station,
Department of Agriculture and Stock, Brisbane.

Directions for sampling issued by the seed testing station are—

(1) When sending samples, it is of the utmost importance that they be drawn by the sender from seeds in his actual possession, care being taken to make them truly representative of the bulk.

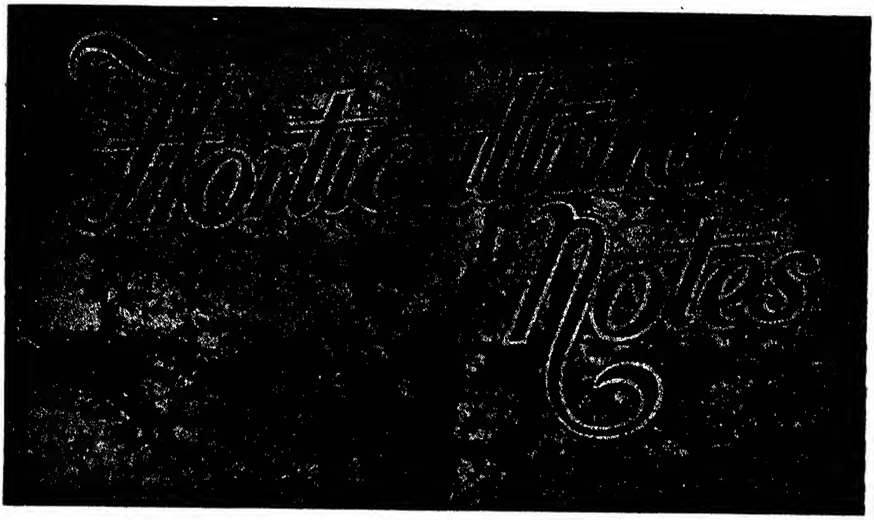
(2) To enable this to be done satisfactorily they should be drawn alternatively from the top, middle and bottom of the bags, the proportion of bags to be sampled being as follows:—

1 to 19 bag lots—a portion from each bag.
20 to 39 bag lots—a portion from not less than 20 bags.
40 to 59 bag lots—a portion from not less than 28 bags.
60 to 79 bag lots—a portion from not less than 32 bags.
80 to 99 bag lots—a portion from not less than 36 bags.
100 to 199 bag lots—a portion from not less than 40 bags.
200 bags and over—a portion from not less than 20 per cent.

(3) If, when drawing samples, it is observed that great variation occurs in the bulk, two or more samples should be obtained, each representing bags of which contents are similar.

(4) After the sample has been drawn as indicated, it should be emptied out on to a large piece of paper, thoroughly mixed, and then a quantity not less than the prescribed weight for such samples should be drawn for purposes of forwarding to the seed laboratory. A duplicate sample should be kept for reference.

(5) In the seed testing station great pains are taken to ensure absolute accuracy of work. It follows, therefore, that all this care is wasted, unless the person sending samples for examination takes the trouble to ensure that the samples drawn truly represent the bulks from which they are obtained.



Green Manure for Stanthorpe Orchards.

THE supplying of organic matter to Stanthorpe soils is fundamentally important for the maintenance of soil fertility, and the ploughing under annually of bulky green crops is the most effective means of building up the soil content of this material. Leguminous crops are particularly valuable because, in addition to organic matter, they supply nitrogen in a cheap form, and thus make possible a saving in artificial nitrogenous fertilizers.

Based on tests of a large number of potential winter-growing varieties of green crops, and on extensive fertilizer trials, the following recommendations are made for the guidance of orchardists in the Stanthorpe district.

1. VARIETIES FOR WINTER GROWTH.

Legumes.—New Zealand blue lupins and golden tares are outstanding in their ability to resist both severe frosts and soil dryness. When grown for the first time, inoculation of the seed with proper strains of root nodule bacteria is advisable. Bacterial cultures for the inoculation of these crops are available from the Department of Agriculture and Stock, Brisbane. Other legumes tested, but not found to fulfil local requirements are tick bean, purple vetch, dun field pea, and clover.

Cereals.—Black winter rye corn is recommended because of its ability to grow successfully under Stanthorpe conditions. Florence wheat and Sunrise oats are suitable under most conditions, but the latter will not survive severe frosts. Cape barley has been the least satisfactory of all cereals tried.

2. SOWING.

Before sowing, the land should receive preparatory cultivation, preferably a ploughing, and then the seed should be broadcast and buried by cultivator or harrows. Recommended rates of sowing are:—

For New Zealand blue lupins or golden tares: 1 bushel per planted acre for the first one or two years; thereafter, $\frac{3}{4}$ bushel may suffice.

For cereals: 1 bushel per planted acre.

3. TIME TO SOW.

Cultural preparations should be made in March, so that both soil and crop will benefit from autumn rains. Early sowing is preferable to late sowing, as the crops should be well established before winter.

4. FERTILIZER TREATMENT.

Fertilizing is indispensable if the crop is to have an opportunity of making adequate growth. Preferably, fertilizer should be broadcast and ploughed under in the course of preparation of the seed bed, rather than applied at the time of sowing. Germination may be impaired when fertilizer is close to the seed. Rates of application are:—

For legumes: 1½ cwt. sulphate of ammonia and 1 cwt. superphosphate per acre.

For cereals: 1½ cwt. sulphate of ammonia per acre.

5. TIME TO TURN UNDER.

To secure the maximum benefit from a green crop it should be turned under in time to allow its decomposition before the spring growth of the fruit tree commences. This is essential if the trees are to receive the supply of nitrogen in the spring from the ploughed-in material. Generally speaking, non-leguminous crops, such as cereals, should be ploughed in at least six weeks, and legumes at least three weeks, before the end of the dormant period of the fruit plants they are intended to benefit.

GROWING FRENCH BEANS FOR SEED.

The most important point to consider in the production of French bean seed is the origin of the seed to be planted in the first place. It is essential that the latter be obtained from a crop which is known to be free from disease. Anthracnose and halo blight, the two most serious diseases of the French bean, are transmitted through the seed and a few affected plants are the main source of general infection in the crop later in the season. The inclusion of a few infected seeds may, therefore, be the ruination of a crop specifically sown for seed purposes.

If it is not possible to ascertain both the origin and purity of the seed, a small stud plot should be established. This plot should be isolated from other beans and the plants regularly inspected, diseased or off-type plants being immediately removed and burnt. Provided the crop in the stud plot is kept free from disease, the seed can be used to plant up a larger area for seed production in the following season.

It should be made a strict rule never to cultivate, or even walk through the plot, when the beans are wet from rain, or even dew, as a man's boots or trousers may spread diseases from plant to plant. During the growing period no one who has worked in a diseased crop should be allowed into a seed bean plot. Visitors should also be excluded.

Before sowing beans for seed, the planter should be thoroughly cleaned out and sprayed, or carefully wiped over with a 5 per cent. solution of formalin. Care should be taken to see that implements are quite free from dirt before moving them to the clean crop.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

THE public demand for fruit is now tending to slow up. This should be a serious consideration for growers now marketing fruits. With cool conditions prevailing, fruit ripens slowly; fruit should be allowed, therefore, to become further advanced in ripening before sending to market. This is particularly applicable to Southern consignments.

Tomatoes, papaws, and pineapples should now be picked showing good colour indications. Green fruit is not wanted in the South. A perusal of prices will show the difference that prevails in market price levels between green and coloured fruit.

The demand for Queensland citrus fruits on Southern markets has been somewhat reduced because of much unsuitable quality fruit being sent South. Some Queensland growers who continue to make this error should realize the importance of sending only first quality fruit to Southern markets. A close study of marketing conditions in the capital cities brings a realization that our main trouble on the market is not over-production, but over-marketing of low-grade fruit. Prices at the end of May were—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 6s. to 9s.; Sixes, 5s. to 11s. 6d.; Sevens, 7s. to 12s. 6d.; Eights, 11s. to 13s. 6d.; Nines, 11s. to 14s. 6d.; Bunch, per dozen, 1½d. to 5d.

Sydney.—Cavendish: Sixes, 6s. to 10s.: Sevens, 8s. to 13s.; Eights and Nines, 12s. to 18s.

Newcastle.—Cavendish: Sixes, 15s. to 16s.; Sevens, 15s. to 18s.; Eights and Nines, 17s. to 19s.

Melbourne.—Cavendish: Sixes, 12s. to 14s.; Sevens, 13s. to 16s.; Eights and Nines, 16s. to 18s.

Adelaide.—Cavendish, 14s. to 18s. per case.

Brisbane.—Lady Fingers, Bunch, 1d. to 8d. dozen.

Brisbane.—Sugars, 3½d. to 5d. dozen.

Pineapples.

Brisbane.—Smoothleaf, 3s. to 7s. case; loose, 1s. 6d. to 5s. dozen.

Sydney.—Smoothleaf, 6s. to 12s.

Newcastle.—Smoothleaf, 8s. to 11s.

Melbourne.—Smoothleaf, 8s. to 13s.

Adelaide.—Smoothleaf, 12s. to 16s. case.

Brisbane.—Ripleys, 4s. to 6s. case; 1s. to 3s. per dozen.

Papaws.

Brisbane.—Yarwun, 6s. to 8s. tropical case; locals, 3s. to 5s. bushel; Gunalda, 5s. to 7s. bushel.

Sydney.—10s. to 14s. tropical case.

Melbourne.—15s. to 18s.

Custard Apples.

Brisbane.—2s. to 4s. half bushel.

Sydney.—3s. to 6s. half bushel.

Newcastle.—5s. to 6s. half bushel.

Melbourne.—5s. to 7s. half bushel.

ROSELLAS.

Brisbane.—2s. to 2s. 6d. bag.

AVOCADOS.

Brisbane.—7s. to 8s. half bushel. Specials higher.

Sydney.—10s. to 12s. half bushel.

Passion Fruit.

Brisbane.—First Grade, 9s. to 13s. half bushel; seconds, 4s. to 7s. half bushel.

CITRUS FRUITS.

Oranges.

Brisbane.—Navel Oranges, 5s. to 9s. bushel; commons, 4s. to 8s. bushel.

Sydney.—6s. to 12s.

Mandarins.

Brisbane.—Fewtrells, 5s. to 7s. bushel; Emperors, 5s. to 9s. bushel; Scarlets, 6s. to 9s. bushel; Glens, 8s. to 14s. bushel.

Sydney.—Emperors, 10s. to 12s.; Glens, 11s. to 13s.

Melbourne.—Fewtrells, 10s. to 12s.; Glens, 14s. to 18s.; Emperors, 12s. to 14s.

Grape Fruit.

Brisbane.—5s. to 8s. bushel.

Sydney.—8s. to 14s. bushel.

Melbourne.—10s. to 14s. bushel.

Lemons.

Brisbane.—6s. to 13s. bushel.

Sydney.—10s. to 15s.

Melbourne.—10s. to 13s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Stanthorpe, Granny Smith, 5s. to 7s. bushel; imported apples, 6s. to 9s. bushel.

Pears.

Brisbane.—Imported, 6s. to 12s. 6d.

Tomatoes.

Brisbane.—Coloured, 2s. to 5s. half bushel; ripe, 2s. to 3s. 6d.; green, 2s. to 4s.

Sydney.—Coloured, 8s. to 10s.; green, 5s. to 8s.

Newcastle.—Green, 4s. to 5s.: coloured, 7s. to 8s.

Melbourne.—Queensland, 7s. to 8s.

South Australian Celery.—12s. to 20s. per crate; local, 1s. 6d. to 2s. bundle.

VEGETABLES. (Brisbane, unless otherwise stated.)

Beans.—First quality, 4s. to 7s.; second grade, 2s. to 4s. bag. Sydney: 3s. to 7s. bushel. Melbourne: 7d. to 8d. lb.

Peas.—8s. to 13s. sugar bag; poor quality lower.

Cabbage.—Small, 9d. to 1s. 6d.; prime, 2s. to 4s. bag.

Cauliflowers.—Locals: Small, 3s. to 5s.; prime, 6s. to 12s. bag. Stanthorpe, 8s. to 13s. chaff bag.

Carrots.—3d. to 1s. 3d. bundle.

Beetroot.—4d. to 1s. bundle.

Rhubarb.—6d. to 1s. 6d. bundle.

Cucumbers.—7s. to 9s. bushel.

Marrows.—1s. to 3s. dozen.

Lettuce.—6d. to 2s. dozen.

Pumpkins.—3s. to 4s. bag.

Chokos.—1d. to 3d. dozen.

English Potatoes.—2s. 6d. to 4s. sugar bag.

Sweet Potatoes.—2s. to 3s. sugar bag.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Aryshire Cattle Society, production charts for which were compiled during the month of April, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	AUSTRALIAN ILLAWARRA SHORTHORNS.			
	MATURE COW (STANDARD, 350 LB.).			
Newlands Empress 2nd	J. F. Evans, Malanda	14,660·4	565·109	Greyleigh Sunbeam
Rhodesview Biddy 14th (365 days)	W. Gierke and Sons, Helidon	11,710·35	543·264	Blacklands Prospector
Sunnyside Empress 33rd (365 days)	P. Moore, Sunnyside, Wooroolin	14,912·38	536·245	Bruce of Avonel
Sunnyside Daisy 22nd	P. Moore, Sunnyside, Wooroolin	13,739·8	490·016	Patrol of Cosey Camp
Corunna Dainty	J. H. Anderson, Fairvale, Southbrook	12,752·62	476·737	Gambol of Wilga Vale
	SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Fairvale Jean	J. H. Anderson, Fairvale, Southbrook	10,500·38	428·671	Blacklands Czar
	JUNIOR, 4 YEARS (STANDARD 310 LB.).			
Cedargrove Pearl	P. D. Flechtner, junr., Pilton View, *via* East Greenmount	8,467·5	341·223	Cedargrove Umpire
	JUNIOR, 3 YEARS (STANDARD, 270 LB.).			
Blacklands Sultan's Fairy	Estate P. Doherty, Box 31, Gympie	8,684·3	389·975	Sultan 2nd of Blackland
Balcarres Dot 5th (258 days)	W. H. Reeve, Balgowan, Muldu	7,099·3	285·354	Morden Signal
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Sunnyside Marvelette 2nd (365 days)	P. Moore, Sunnyside, Wooroolin	9,769·55	346·914	Cosey Camp Rupert
Chelmer Olive	E. O. Jeynes, Newhaven, Raceview, Ipswich	7,829·4	334·595	Daphne's Elect of Hillview
Bileena Dulcie	A. T. Paull, Bowenville	5,342·1	271·751	Murray Bridge De Valera
Trevor Hill Spangle	Geo. Gwynne, Umbiram	7,355·14	267·291	Corunna Supreme
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Faversham Dewdrop 2nd	R. J. Couchman, Warra	8,226·77	311·331	Faversham Rex
Trevor Hill Mermaid 2nd	Geo. Gwynne, Umbiram	7,854·72	286·965	Corunna Supreme
Blacklands Melba 13th	T. Ryan, Kital, Allora	6,596·6	266·078	Blacklands Treasurer
Bileena Myrtle 2nd	A. T. Paull, Bowenville	5,719·75	263·169	Murray Bridge De Valera
Cedar Grove Tuckumbil 23rd	T. Ryan, Kital, Allora	6,924·1	261·452	Cedar Grove Trump
Trevor Hill Lola	Geo. Gwynne, Umbiram	6,063·62	245·439	Corunna Supreme

JERSEY.

MATURE COW (STANDARD, 350 LB.).

Kathleigh Brown May (365 days)	F. W. Kath, Moffat, *via* Dalby	14,852·7	808·296	Retford Royal Atavist
Lermont Silver Bell (Twin)	J. Schull, Lermont, Oakey	9,356·3	494·668	Woodside Golden Volunteer
Langside Quip	S. H. Caldwell, Walkers Creek, Bell	6,460·13	404·846	Masterpiece Yerribee of Bruce Vale
Sweetheart of Palm Ridges	J. Sigley, Millaa Millaa	6,101·25	369·7	Oceanview Merriamber Wait-a-While

SENIOR, 4 YEARS (STANDARD, 330 LB.).

Kathleigh Royal Mayflower	F. W. Kath, Moffat, *via* Dalby	10,115·03	589·529	Retford Royal Atavist

JUNIOR, 4 YEARS (STANDARD, 310 LB.).

Rush Princess (imp.)	J. Sinnamon and Sons, Moggill	8,866·13	476·045	Rush Fern's Oxford Junior

SENIOR, 3 YEARS (STANDARD, 290 LB.).

Lermont Kitty	J. Schull, Lermont, Oakey	9,669·9	466·789	Woodside Golden Volunteer
Palm Ridges Fanny	J. Sigley, Millaa Millaa	6,635·2	315·209	Oxford Jocular Lad

JUNIOR, 3 YEARS (STANDARD, 270 LB.).

Wyreene Gentle	C. W. Barlow, Irvingdale road, Dalby	6,618·24	361·438	Lyndhurst Majesty
Floss 55th of Grasmere	T. W. McMiken, Southbrook	5,394·72	274·592	Grasmere Floss 21st Duke

SENIOR, 2 YEARS (STANDARD, 250 LB.).

Oxford Jezebel	E. Burton and Sons, Wanora	8,443·0	475·323	Oxford Daffodils King
Lermont Golden Kate	J. Schull, Lermont, Oakey	7,987·4	388·090	Woodside Golden Volunteer
Neurums Elvinas Victorina	P. J. McCauley, Neurum	5,539·95	295·119	Oxford Brown Victory

JUNIOR, 2 YEARS (STANDARD, 230 LB.).

Pride of Linwood	C. W. Barlow, Irvingdale road, Dalby	7,201·7	404·101	Listowel Royal Heir
Lermont Posy	J. Schull, Lermont, Oakey	7,337·35	383·840	Woodside Golden Volunteer
Lermont Lady	J. Schull, Lermont, Oakey	7,285·0	354·456	Belgonia Lady's Duke
Oxford Silver Maid	E. Burton and Sons, Wanora	6,193·9	311·427	Retford May's Victor
Oxford Elaine	E. Burton and Sons, Wanora	5,878·75	305·569	Oxford Jovial Lad
Trinity Cute Duchess	J. Sinnamon and Sons, Moggill	5,824·12	293·275	Cute Prince 3rd (imp.)
Trinity Lily's Queen	J. Sinnamon and Sons, Moggill	5,110·73	286·026	Cute Prince 23rd (imp.)
Trinity Royal Gleam	J. Sinnamon and Sons, Moggill	5,781·62	268·969	Trinity Royal Sovereign
Trinity Cute Violet	J. Sinnamon and Sons, Moggill	4,613·91	255·857	Cute Prince 3rd (imp.)
Oxford Dainty May	E. Burton and Sons, Wanora	5,030·0	252·005	Retford May's Victor
Trinity Handsome Belle (253 days)	J. Sinnamon and Sons, Moggill	4,711·53	230·75	Cute Prince 3rd (imp.)

AYRSHIRE.

SENIOR, 3 YEARS (STANDARD, 290 LB.).

Myola Jollity 2nd	R. M. Anderson, Southbrook	10,591·87	412·318	Benbecula Bonnie Willie

JUNIOR, 3 YEARS (STANDARD, 270 LB.).

Myola Jaunty	R. M. Anderson, Southbrook	7,247·9	275·111	Benbecula Bonnie Willie

General Notes

Staff Changes and Appointments.

The following transfers of officers of the Department of Agriculture and Stock have been approved:—

Dr. L. G. Miles, B.Sc.Agr., Ph.D., from South Johnstone to Biloela;

Mr. T. G. Graham, Instructor in Agriculture, from Ayr to South Johnstone;

Mr. C. H. P. Defries, Instructor in Agriculture, from Roma to Ayr; and

Mr. W. R. Straughan, Instructor in Agriculture, from Gympie to Chinchilla.

The Officer in Charge of Police, Silkwood, has been appointed also an acting inspector of stock.

Messrs. W. W. Chapman (Hambledon) and H. E. Moody (Cairns) have been appointed honorary protectors of fauna.

Mr. H. Barfield, Cattle Creek Co-Operative Sugar Milling Association, has been appointed millowners' representative on the Cattle Creek Local Sugar Cane Prices Board.

Mr. D. S. Robertson, inspector under *The Stock, Slaughtering, and Dairy Produce Acts*, Monto, has been appointed also an inspector under *The Brands Acts.*

Mr. N. H. Piket, Morningside, has been appointed an inspector under *The Diseases in Stock Acts*, *The Slaughtering Act*, and *The Dairy Produce Acts*, Department of Agriculture and Stock.

Messrs. F. C. Jorss (East Brisbane), R. J. Rollston (Greenslopes), and H. Lambert (Sunnybank) have been appointed inspecting cane testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Maryborough, respectively.

Messrs. H. W. McLean (Keppel Sands, Rockhampton) and W. Sievers (Strathalbyn, near Collinsville) have been appointed honorary protectors of fauna.

Constable D. E. W. Sprenger (Biggenden) has been appointed also an inspector under *The Slaughtering Act.*

Messrs. W. Grimes (chairman of the Bundaberg Cane Disease Control Board) and S. C. Shearer (Pioneer Sugar Mills (Pty.) Ltd., Pioneer, via Townsville) have been appointed honorary inspectors under *The Sugar Experiment Stations Acts.*

The appointments of Messrs. W. G. Batchler (West Bundaberg) and C. S. Wynter (Townsville) as honorary inspectors under *The Sugar Experiment Stations Acts* have been cancelled.

Mr. H. Bell, Inspector under *The Stock, Slaughtering, and Dairy Produce Acts*, has been transferred from Doboy to Chinchilla.

Mr. T. H. Sewell, Lang street, Dutton Park, has been appointed an honorary protector of fauna and an honorary ranger under *The Native Plants Protection Act.*

Constable J. J. Mooney, Rosedale, has been appointed also an inspector under *The Slaughtering Act.*

Qualischefski Dip.

In announcing the result of the recent test conducted by the Department of Agriculture and Stock of the claims made by Mr. A. Qualischefski for an improved dip against cattle tick, the Minister for Agriculture and Stock (Hon. F. W. Bulcock) pointed out that the test had been a thoroughly comprehensive one. It had been carried out under the supervision not only of departmental experts, but of representatives of the United Graziers' Association and of the Selectors' Association.

Mr. Qualischefski had claimed that—

(*a*) the dip killed all ticks on a beast;

(*b*) following two dippings at an interval of four weeks, cattle remained free from three to four months;

(*c*) female ticks from dipped cattle would not breed.

The Committee had furnished Mr. Bulcock with a unanimous report, finding that none of these claims had been substantiated.

Plywood and Veneer Boards.

Orders in Council (two) have been approved for the extension of operations of the Plywood and Veneer Board and the Northern Plywood and Veneer Board for the period from 3rd May, 1942, to 2nd May, 1947.

Veterinary Registration Fee.

An amendment of Regulations under *The Veterinary Surgeons Act* provides that a fee of £1 1s. may be charged for the restoration to the register of veterinary surgeons of the name of any veterinary surgeon previously removed therefrom.

Tomato Maturity and Grade Standards.

The Fruit and Vegetable Grading and Packing Regulations of 1928 *issued* under "*The Fruit and Vegetables Acts,* 1927 *to* 1939," have been amended to provide new maturity and grade standards for tomatoes.

"Mature" in the case of tomatoes means that the tomato has reached its maximum growth and has reached or passed the stage of its maturity when the skin has changed from a dull green to a bright green colour, and its flesh surrounding the seed has changed from a light green colour to a deep amber or to a deep amber tinged with pink.

A and B grade standards are provided, and all tomatoes must be graded into the following seven sizes, viz.:—"Small," 2 inches, 2¼ inches, 2½ inches, 2¾ inches, 3 inches and "Large."

Wild Life Preservation.

An Order in Council has been issued under "*The Fauna Protection Act of* 1937," declaring parts of Stones Creek and Sandalwood Holdings (Strathalbyn Homestead, near Collinsville) to be a sanctuary under and for the purposes of the abovementioned Act.

Cane Levy.

An Order in Council has been issued under *The Regulation of Sugar Cane Prices Acts,* providing that the assessment which the Minister may make and levy on every ton of sugar-cane received at any mill in Queensland, with the exception of Moreton, Kalamia, and Invicta mills, shall be one penny farthing (1¼d.) per ton. The assessments on sugar-cane received at the Moreton, Kalamia, and Invicta mills have been fixed at 5¼d., 2d., and 6¼d. per ton, respectively. The increased levies at these mills have been made to meet the cost of surveys. The assessment is borne by the canegrower and the owner of the mill in equal proportions, and all sums raised thereby are paid into the Sugar Cano Prices Fund.

Hail Insurance.

A regulation issued under *The Primary Producers' Organisation and Marketing Acts* provides that the Canary Seed Board hail insurance regulations shall not apply to and shall have no force or effect in respect of canary seed planted during the year 1941.

"THE DAIRY PRODUCE ACTS, 1920 TO 1939."

An examination will be held for Certificates of Proficiency in the subjects of Milk and Cream Testing and Milk and Cream Grading on Saturday, 19th July, 1941, and in the subjects of Butter Making and Cheese Making on Saturday, 26th July, 1941, in centres that will, as far as possible, be arranged to suit candidates, who should notify the undersigned not later than the 20th June.

Entrance fee 5/- for each subject should accompany the application.

Candidates must be not less than eighteen years of age on the day of the examination.

R. P. M. SHORT, Under Secretary,
Department of Agriculture and Stock,
Brisbane.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.

Two Weeds.

W.H.E. (Colusseum)—

1. *Herpestis chamaedryoides.* This small plant is a native of tropical America, now naturalised in most tropical countries. It is quite common in North Queensland, where it has been established for the past twenty years or more. Though small, it is rather an aggressive weed. Where digging out is impracticable, it would probably succumb to weak arsenical sprays, or if these cannot be used because of the presence of stock, sodium chlorate sprays could be used. A weak solution of this latter would suffice, say 1 lb., or even less, to 10 gallons of water. Probably more than one spraying would be necessary. We have not heard a common name applied to this weed.

2. *Acanthospermum hispidum,* Star Burr. This is one of the commonest weeds in North Queensland. It is, however, not particularly difficult to eradicate in farming areas, or in comparatively confined places. In the larger areas, such as some of the pastoral holdings in the Gulf country, it is very difficult to keep under.

Trees and Shrubs for the Dalby District.

A.G. (Dalby)—

We are doubtful whether Laburnum or the Hawthorn would succeed around Dalby. We would hesitate to plant a whole hedge. A couple of individual plants, of course, would be different. Probably the best hedge for a garden at Dalby would be the privet: the large-leaved variety for a tall hedge or windbreak and the small-leaved variety for smaller hedges. The variety known as Golden Privet is excellent for general garden purposes.

Bottle Trees do excellently around Dalby. There are many about the town, and you could easily obtain seed, or if you prefer it, you could have them transplanted from the district scrubs. They can be transplanted as quite large specimens, say 8 feet or higher.

Kurrajong: Seeds could probably be obtained from Toowoomba nurserymen. They may also be transplanted when quite large.

White Cedar: One of the best of the native trees for Western Queensland. The common pepperina is one of the hardiest.

Two trees of some importance are the Portuguese Elm (the leaves of which are a valuable fodder for stock), and the Carob Bean (the pods of which also are valuable feed for stock). A packet of Portuguese Elm and Carob Bean seed has been posted to you.

If you have a property outside Dalby, the Forestry Sub-Department, Executive Buildings, Brisbane, send trees out to farmers at low rates. From its list, the following would suit you:—Hoop Pine, Bunya Pine, Crow's Ash, Loblolly Pine, Mexican Cypress, Blue Cypress.

Blue Panic—Stink Grass.

L.A. (Millmerran)—

1. Blue Panic (*Panicum antidotale*), now grown fairly extensively in many parts of Queensland. Like Guinea Grass, we think that this is an excellent species to have a small area for periodical cutting or feeding-off. The stems become rather caney, but send out tufts of leaves from the nodes, and these are readily eaten by stock.

2. Stink Grass (*Eragrostis cilianensis*), a native of southern Europe, now established in parts of Queensland as a very common farm weed. Stock will sometimes eat it, but on the whole it is unpalatable, and should be regarded as only a weedy species.

A Small Blue Grass.

Inquirer (Winton)—

The specimen is *Dichanthium humilius,* a small Blue Grass which we were very interested to see. We had received only a couple of fragments before from different parts of Queensland, and it has always been looked on as extremely rare. This year, many grasses which had previously been regarded as rare or little known have suddenly covered large areas, because, no doubt, of the extraordinary season. The ordinary Blue Grass is *Dichanthium sericeum,* and the present species was looked on as a variety of this, but is now regarded as a distinct species. It occurs in South Australia and Central Australia. It has not yet been found in New South Wales.

If you have any other grasses that seem new to you at the present season, we would be very pleased to receive specimens.

Red Natal Grass.

W. (Brisbane)—

Red Natal Grass (*Rhynchelytrum repens*) was originally introduced as a fodder by the Queensland Acclimatization Society many years ago, and is now very widely spread over the State. It is of indifferent value as a fodder. In its green state, it has a very slight hold of the ground, and is easily pulled up by grazing animals. Towards the winter, it becomes dry and unpalatable. Although widely spread, in Queensland it is mostly found in old cultivation lands and along railway enclosures. In many of the fruit-growing areas, it is a common weed of cultivation, and is frequently used as a "chop-chop" for working horses, and is quite good for the purpose, especially when mixed with better-class fodders.

"Mullumbimby Couch."

C.S.A. (Toowong)—

The specimen represents the Mullumbimby Couch (*Kyllinga brevifolia*), a very common weed in blue couch lawns about Brisbane. It is especially abundant on lawns badly drained or shaded by trees, but is not confined to such situations, and sometimes infests lawns on better ground. The only method of keeping the plant in check that we know of is to feed the blue couch grass, either by top-dressing or by a light dressing of fertilizer, especially meatworks fertilizer, and keep regularly cut. If this is done, it should choke out the Mullumbimby Couch.

"Monkey Vine."

H.McB. (Millmerran)—

The vine specimen is *Lyonsia eucalyptifolia.* The only local name we have heard applied to this plant is Monkey Vine. It is fairly common in parts of Western Queensland, but, according to most pastoralists, not common enough, as they regard it as an excellent fodder. It belongs to a dangerous family (*Apocynaceae*), however, and has at times been suspected of poisoning stock, but we do not think this suspicion has rested on sufficient evidence.

"Farmers' Lice."

A.M. (Beenleigh)—

Your specimen is *Siegesbeckia orientalis,* sometimes called Farmers' Lice, because the seeds stick to clothing, feet of animals, or anything else they come in contact with. The plant is a very common weed in coastal Queensland, and during the past season has spread as far west as Mitchell. It is a very common farm weed, but generally not very difficult to eradicate. It is not known to possess any poisonous or harmful properties, and is readily eaten by stock.

"Prickly Pine."

R.C.W. (Townsville)—

The tree in flower is *Bursaria incana.* It is very widely spread in Queensland, and belongs to the *Pittosporaceae.* It is commonly called Prickly Pine, and the leaves are regarded as excellent fodder for stock.

Rural Topics

What are the Costs of Production?

A lot is heard nowadays about costs of production. Many farmers claim that prices should be high enough to enable them to cover cost of production plus a reasonable profit. That is fair enough, and it is a claim with which everyone will agree. It is no more than the farmer is entitled to, but—and this is a point which strikes right home after a moment's thought—on whose cost of production should prices be based? It is well known how remarkably costs vary on different farms. Take dairying, for instance—the biggest factor in costs of production is the yield per cow or per acre. The farmer who obtains low yields invariably has high cost figures.

Records like these, of course, serve to stress the importance of sound farm management. Unless seasonal conditions are exceptionally bad—such as drought or excessive rainfall—cost of production must be based on yields that can be reasonably expected under intelligent systems of farming. To get such yields it must be admitted that more attention should be given to herd testing for milk production and also to the very important matter of soil fertility.

Digging for Victory—and Prosperity.

The penalty of neglecting agriculture has been incurred by many people during this war. That is evident from the viewpoint expressed in this news item from England:—

> "No citizen is more responsive to the call for national service than the farmer. The country has been forced by hard facts to recognise the primary importance of British agriculture to the defence of the nation, the economic welfare of its people, and the support of public finance. When the war is ended we must dig for prosperity as we are now digging for victory."

The British Commonwealth and Food Production.

In view of the present export situation, a statement from a source of authority in Great Britain is very interesting to Queensland producers. Here is the statement:—

> "It has become evident that in an emergency we must depend more and more on the British Commonwealth. We have found that supplies from friendly nations may, through no fault of their own, suddenly dry up.
>
> "Accordingly for the present essential confidence there should, apart from preservation of the home industry, be the guarantee that the countries of the Empire will in due course be brought together to hammer out a scheme of Empire security by the production of food."

Good News for the Cook.

Cabbages which have lost their characteristic odour, but retain all their other properties, have been produced by research workers at the Cornell University (U.S.A.). It took six years of effort and 4,000 cabbages before the smell was eliminated.

A New Breed of Sheep.

From the United States comes news that another new breed of sheep has been developed by an American sheep specialist who claims for his breed—which he has named the Southdale—that it produces an ideal dual-purpose animal specially adapted for the small farm.

The new breed has been developed by crossing the Southdown and the Corriedale breeds. As the Corriedale itself is a comparatively new breed, it may be found that some years must elapse before the type of breed can be said to have become definitely fixed.

The producer of the Southdale says that the Southdown is noted for its mutton qualities, but produces a light weight, short staple fleece, which is, however, of a high wool quality. The Corriedale he regards as not so good a mutton breed as the Southdown, but produces a high-quality heavy, long staple fleece. In the new breed the wool yield is said to be heavier than that of the Southdown, and the mutton is of better quality than that of the Corriedale.

At least one Argentine sheep breeder is, it is reported, breeding, and is actually offering for sale, rams which he describes as cross-bred Southdown Corriedales.

A New Way of Drying Foods.

Evaporation of moisture, plus semi-refrigeration of foodstuffs, is being tested in Britain with a small plant designed to dry products at low temperatures. This plant has been in operation for a year or more. Many different foods have been treated, including meat, fruit, and vegetables, and it is claimed that the products are, in general, much better than those obtained by other methods of drying.

Oranges for the Nose Bag.

Some race horse owners in California are finding, we are told, that their horses feel better and run faster when citrus fruits are added to their daily diet. Well, why not? Science has proved the value of oranges in human diet, so they ought to be good for beast as well as man.

Beans for the Tin.

Talking of the possibilities of starting new lines of production, here is what a farmer in the New England district, not very far below the Queensland border, has done. When he realised that the supply of beans for canning was likely to be cut off, he decided to put in a large area of the Little Navy variety of bean. It is a small white bean and pretty well just what the canners want . He went ahead and to-day is harvesting an excellent crop which the canners have agreed to take. He put about 20 acres under crop, and from this area he got 15 tons of beans and 600 bales of bean hay, which he is now storing for winter feed for his stock. He is quite satisfied that the growing of beans for canning and the making of bean hay from the bean plants is a profitable sideline where soil and other conditions are suitable.

A "Mixed" Farm.

How is this for farming variety? A large farm, not far south of the border, runs crossbred sheep, pigs, and beef cattle. In addition, it grows lucerne, maize, oats, wheat, root crops, and tobacco. Winner in the district open fodder competition, among its fodder reserves is a pit of wheaten and oaten hay put down twelve years ago. This farm is just under 1,800 acres and this is what was got off it last year:—Five cuts of lucerne, 20 tons of tobacco, 120 fat vealers, and 500 fat lambs. It is now carrying 1,000 sheep, 300 head of cattle, 60 pigs, and 10 horses. Its feed reserves are made up of lucerne hay, wheaten and oaten hay, mixed lucerne and grasses, pitted silage and a heavy tonnage of pumpkins—enough feed it is reckoned to tide between 3,000 and 4,000 sheep over a dry time.

Who Shall Inherit the Earth—Man or Bug?

Insect pests are the producers' worst enemies. Ask any sheep man what he thinks about blowflies, for instance; and that is why we have to be keenly alert in war time, and especially so when we remember that with modern speed in transport—particularly air transport—much of our immunity from insect invasion has gone. When long voyages were the rule, the very length of a voyage constituted an effective period of quarantine so far as we in Australia were concerned. In the United States there is a real fear that this war may increase the worry of those concerned with insect pest control. In a publication received in the American mail recently, the United States Bureau of Entomology and Plant Quarantine had this to say:—

> If history is allowed to repeat, the war may add to the insect pests that have invaded new territory because of armed conflict among men. The Hessian fly (there is a familiar ring about that—the Hess-ian fly!) which each year destroys wheat with an estimated value of many millions, came with the German troops in the days of the War of Independence.
>
> Then the bedbug, cockroach, and housefly found the trip to North America easy and the new world congenial, with the codling moth, the Japanese beetle, and the pink bollworm confirming this subsequently.

Evidently those pests did not trouble much about the Monroe Doctrine!

On the other hand, the dreaded Colorado beetle, which does so much damage to potato crops, crossed the Atlantic to Europe in 1917 with the American army and settled in France, and afterwards spread to Germany, where it is now one of the worst farm pests. That suggests that the Germans will receive something even more deadly and disturbing from America this time.

Well, it is estimated that there are over 400 million kinds of insects in the world, and all of them are of significance to the human race. All are our competitors for the world's food supply. As to who shall inherit the earth—man or bug—will depend in the final analysis on which creature is most efficient in fighting for his daily ration.

Farm Notes

JULY.

EARLY-MATURING wheat varieties such as Florence, Novo, and Seaspray are very suitable for late sowing, while the popular medium-early varieties Flora, Three Seas, and Pusa may also be sown with every chance of success.

Stock should be removed from early-sown wheat subjected to grazing by the end of the month if a satisfactory yield of grain is desired.

Canary seed, which has proved suitable for the black basaltic Downs soils, may be sown during July, drilling in approximately 15 lb. sound seed per acre. Although usually harvested for seed, the crop will make excellent hay or provide useful grazing.

Potato planting will be commencing on lands east of the Main Range where late frosts are not a deterrent. Cut sets may be used, dusting the cut surfaces with wood ashes or slaked lime shortly after cutting, but whole seed not less than 2 oz. in weight is to be preferred. Seed-borne disease can be prevented by treating with either hot formalin or with corrosive sublimate, as advised in a leaflet issued by this Department. Old potato lands deficient in humus can be made more productive by ploughing in green manure crops, and the application of suitable fertilizers when planting.

After the harvesting of late maize, old stalks should be ploughed in and allowed to rot. All headlands will be improved by clearing up weeds and rubbish, preferably with a good fire.

Mangolds, swede turnips, and similar root crops which are making satisfactory growth should be thinned out to suitable distances apart in order to encourage full development, while the necessary inter-row cultivation should not be overlooked. The root system of autumn-sown lucerne should now be well established, and will be strengthened by an early mowing if fair top growth has been made.

Any infestation of weeds during the spring can be kept in check by frequent mowing without regard to the quantity of hay secured. When fully established, cuttings can be regulated to coincide with the commencement of flowering.

PASTEURISATION.

Although the term pasteurisation is very commonly used nowadays, there perhaps, are many who do not know its origin and meaning. Actually it dates back to 1860-1864 when Louis Pasteur, the famous French scientist, conducted experiments on "diseases" in wine and beer, and found that heating for a short period at a temperature of 140 deg. F. was sufficient to prevent abnormal fermentations and the souring of these beverages. This process of heating liquids to check the growth of undesirable microbes was extended to other industries, and was given the name pasteurisation in honour of Pasteur, who had first employed it.

To-day it is best known through its application to the dairying industry. The pasteurisation of milk simply means that the milk is heated to a temperature of 145 deg. F. for thirty minutes and then cooled as quickly as possible to 50 deg. F. or lower. Cream in the butter factories is heated to 185 deg. F. for a few seconds, and then cooled rapidly to 40 deg. F.

Pasteurisation aims, firstly, at making milk and milk products safe, by destroying any disease germs that may be present; and, secondly, at improving the keeping quality of butter and cheese made from milk and cream so treated. It, however, has its limitations. It cannot perform miracles, such as improving the grade of cream from second to choice, or eliminating strong weed taints. Most dairy farmers are now aware of this and know that the production of choice quality cream depends on the care and attention given at the farm, and that the pasteurisation process is beneficial in that a butter of choice quality can be manufactured to withstand long periods of cold storage.

Orchard Notes

JULY.

THE COASTAL DISTRICTS.

CITRUS fruits, with the exception of the late-ripening varieties, will have been harvested by now, and cultural operations should be receiving attention.

Trees showing indications of impaired vigor will require a somewhat heavy pruning, both in respect of thinning and shortening the branches. Where the trees are vigorous and healthy a light pruning only will be necessary, except in the case of the Glen Retreat mandarin. The densely growing habit of this variety leads to a profusion of weak shoots, which, if allowed to develop, will cause overbearing with resultant small and inferior fruit at an early age.

Where trees show signs of failing, look for collar rot at or near ground level. The roots should be examined for disease, and in the North Coast districts for the citrus root bark channeller. A light application of paradichlorobenzene buried a few inches deep in circular drills around the tree and with the surface stamped firmly has been recommended for controlling this pest. The distance between the circular drills should be not more than 18 inches, and care should be taken to prevent the crystals of paradichlorobenzene from coming into contact with the roots. It may be necessary to repeat the application after an interval of three or four weeks.

Where it is necessary to control brown spot of the Emperor of Canton mandarin, black spot, melanose, and scab, the fungicide should be applied at the correct time. The control measures recommended are—

For Brown Spot.

Home-made cuprous oxide mixture (3-40)—

(1) At ½ to ¾ petal fall (i.e., as soon as the majority of the fruit has set).

(2) Two months later.

(3) In late February.

For Black Spot.

Home-made cuprous oxide mixture (3-40)—

(1) At ½ to ¾ petal fall.

(2) Two months later.

For Melanose and/or Scab.

Home-made cuprous oxide mixture (3-40)—

(1) At ½ to ¾ petal fall.

Certain applications of these copper sprays may be combined with various insecticides and mixtures to correct mineral deficiencies, such as zinc. Information regarding these mixtures can be obtained from this Department.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, of which lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms should be suitably reduced, leaving from two to four on each arm. Under favourable conditions, these will be in a fit condition to receive selected buds from desirable trees by the following autumn. It is desirable that when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be finished as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth being regulated by local conditions and the nature of the original preparation of the land. After the ploughing, the land should be worked down to a fine state of tilth. On hillside orchards, attention should be given to the

control of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

Planting of trees may be continued and, with the exception of custard apples, expedited. The attention of citrus growers should be confined to varieties suited to their local conditions.

Pruning of grape vines should be completed, and where cuttings for planting are required these should be selected, trimmed, and heeled-in in slightly dry soil. Canes intended for cuttings should not be allowed to lie about and dry out, but should be treated the day they are severed from the plant. Cuttings are frequently made too long. From 10 to 12 inches is a suitable length which allows for insertion in the soil so as to permit of the top bud, with a short section of the internode, protruding above the surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL pruning, other than that applied to peaches and varieties which are late in coming into growth, should be finished this month, and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. When there are indications of the swelling of the buds, the time is opportune for working over unprofitable trees, where the stock is reasonably vigorous. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

Pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation, as they are subject to much variation.

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted, deep working is most detrimental.

Plate 128.
A WELL MOUNTED AUSTRALIAN LIGHT HORSE TROOP (MILITIA).

THE HOME and THE GARDEN

Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH: NATION'S WEALTH.

SOME DEFECTS OF FEET AND LEGS IN EARLY CHILDHOOD.

The Structure of the Normal Foot.

IN our article last month we talked to mothers and fathers—and to all who have any part in the supervision or education of children—about the care of the feet in infancy and childhood. We noted the beauty and suppleness and strength of the normal baby foot and asked that parents should appreciate the value of Nature's gift to children and do all they can not to spoil it. We emphasised the different ways those beautiful baby feet can be disfigured and deformed by ordinary footwear. This month we are going to talk about certain weaknesses and sometimes deformities of the feet and legs which baby may be born with or which may show themselves early in his life. To help those who did not see our last month's article to a better understanding of these deformities we will explain again that the sole of the foot is arranged in the form of two arches, a long one stretching from the heel to the toes and a short one stretching from the inside to the outside of the foot. This arrangement may be compared to a dome. Normally, the weight of the body is borne by the strong bone at the top of the arch and is passed on through the other bones of the foot to the heel and toes, most of the weight being taken by the outer part of the foot. The bones of the feet, like all the other bones in baby's body, begin to form long before birth, and normally they grow in a symmetrical manner and according to a very definite plan, so that baby is born with the beautifully shaped feet we have described. It must be remembered that it has taken centuries of evolution to develop the feet of human beings into structures which are capable of bearing the weight of a child or adult and keeping him quite steady when standing or walking upright. This stability is brought about by a beautiful balance in the building up of the foot. This balance depends not only upon the arrangement of the bones but also of the muscles and ligaments which are attached to them.

Types of Deformity.

It will be readily understood then that any condition which interferes with the harmonious development of all these parts in the period before baby is born or even afterwards may cause the foot to grow unequally so that one side is not as well developed as the other. This condition would be made worse by the pull of the muscles on the strong side of the foot and later when baby begins to stand on his wrongly balanced foot the deformity would increase. This is because the bones and muscles as they grow tend to adjust themselves to the wrong position. After baby walks extra strain is placed upon the parts and the deformity becomes gradually worse. It is in such a way as this that talipes or club foot is brought about. In this condition the growth of the outer side of the foot outstripes the growth of the inner side which becomes drawn inwards by the muscles. A deformity which usually escapes notice until baby begins to stand is that which results from a falling of the arch of the foot accompanied by bulging on its inner side.

Bow legs and knock knees are not actually foot deformities, but they may cause turning in of the toes and this is often the first thing to be observed in these conditions. Many babies are born with a slight degree of bow legs, but if the condition is very well marked in early infancy or has not improved by the time baby is six months old, advice should be sought at once. Knock knee is usually noticed only after baby has commenced walking. A baby may be born with dislocation of one or both hips, and where he is under trained observation the condition may be recognised before he walks. Otherwise it is often overlooked until he is noticed to be walking in a clumsy waddling manner.

Necessity for Early Treatment.

It will be realised from what has been said that it is of the greatest importance that deformities should be recognised early and particularly before baby has learnt to walk in order that they may be corrected and prevented from becoming worse. Deformities which in early life may be corrected by the simple method of moulding the parts into the correct position and keeping them in that position for a time may require surgical operation if left until later. Mothers are often anxious to know whether it is necessary to have less serious deformities treated. The answer is "yes," for not only may the deformity be unsightly, but it may result in serious disability later. It may cause a handicap by interfering with the proper use of the child's limbs and by affecting the general posture and carriage of the body. Every mother wishes to see her boy or girl able to take part in sports and other such activities when he or she goes to school. Not only is a child's inability to play games like his fellows a handicap to his physical health, but it may affect his mental development also, by giving him a feeling of inferiority. A mother, who neglects to obtain advice regarding any suspected deformity on the plea that she thinks her child will grow out of it, may be condemning that child to a handicap which will affect him all his life. In any case, by seeking advice early, she may save him from a surgical operation. There are so many places where mothers can obtain advice as to procedure in these cases—their own doctors, the Maternal and Child Welfare Centres (Baby Clinics), the out-patients' departments of hospitals, &c. One or other of these services is within the reach of most mothers.

How Mothers can Help.

Remember that Nature is endeavouring always to produce the perfect specimen. When we consider the thousands of beautiful babies that are born in Australia every year, and the relatively few defects which occur, we realise that she nearly always succeeds. Mothers can assist Nature's handiwork by taking special care to eat the right foods both before and after baby comes along, so that baby will have all the necessary building materials for making strong bones and muscles. In a previous talk we mentioned what these foods were. As well as eating the correct foods mothers should have lots of fresh air and sunshine, plenty of rest and sleep, and practise moderation in all things. If, in spite of this care, the structure of baby's body has a small flaw, or through illness or other mischance one occurs later, mothers of to-day should appreciate the fact that owing to the advance in medical science something can be done to correct it.

You can obtain further advice on this or any other matter relating to the feeding and management of children up to school age by writing to "Baby Clinic, Brisbane." Such letters need not be stamped.

Our article next month will be on the care of the premature baby in the home.

IN THE FARM KITCHEN.

SEASONABLE SOUPS.

Haricot Bean Soup.

Soak 4 oz. haricot beans overnight, then place them in a casserole dish with enough stock or water to cover. Cover with a tight-fitting lid and cook until tender. Turn into a saucepan with 1 lb. sliced tomatoes, 2 minced onions, 3 or 4 stalks of chopped celery. Add more stock to more than cover vegetables and simmer until vegetables are tender. Rub through a sieve and keep hot. Melt 1 dessertspoon butter in a saucepan, add 1 dessertspoon flour; cook a little, add puree, and stir until it thickens, then add hot milk to the required thickness. Season with pepper, salt, a little grated nutmeg, and serve with fried croutons.

Mulligatawny Soup.

Place 1½ quarts stock (chicken for preference) in a saucepan with 1 cup chopped apple, 3 tablespoons chopped carrot, 1 cup minced onion, 2 cups water, and if liked 1 or 2 cloves and a bay-leaf or a tiny sprig of fresh thyme. Simmer for about 45 minutes, then rub through a sieve. In the meantime melt 2 tablespoons butter or bacon fat in a saucepan, add 2 tablespoons flour, 2 level teaspoons curry powder, cook a little, stirring all the time; then add stock and stir until boiling point. Simmer for another 10 minutes, then add the juice of a small lemon (about ¼ cup). Serve with a little well-boiled rice.

Onion Broth.

Mince 6 large onions and fry them in 2 oz. butter for five or six minutes. Add 3 cups white stock and simmer for 45 minutes. Put through a sieve and keep hot. Melt 1 tablespoon butter in a saucepan, add 2 tablespoons flour, cook a little, then add 2 cups hot milk and stir until mixture thickens. Simmer for five minutes, then add onion mixture. Beat 2 egg yolks well with ½ cup milk, add to soup and season with salt and pepper, and, if liked, a little cayenne. Do not allow soup to boil after yolks are added, but turn into individual earthenware pots. Sprinkle with a little grated cheese and place in hot oven or under griller to melt cheese. Serve at once.

Cream of Spinach.

Cook 1 bunch spinach in the usual way and rub through a fine sieve. Melt 2 level tablespoons butter in a saucepan, add 2 level tablespoons plain flour and cook a little, add 2 cups stock and bring to boil and then simmer for 5 minutes. Now add 2 cups hot hilk and spinach, salt and pepper, and if liked a little grated nutmeg. A little cream may be added just before serving.

Cottage Broth.

Remove fat from 1 lb. scrag end of mutton and cut meat into small dice. Cut the following into dice also: 1 carrot, 2 onions, 1 swede turnip, 2 sticks celery, 1 parsnip, and 1 small potato. Melt 1 tablespoon good dripping in a saucepan, add meat and bones, and fry until brown, add 4 oz. well-washed rice and fry a few minutes longer. Add vegetables, salt and pepper, and 1 teaspoon sugar, and fry for a few more minutes. Add 5 pints stock or water and bring to boil slowly. Simmer for 2½ hours; remove bones and skim off fat, add 2 teaspoons finely-chopped parsley, and serve piping hot.

Mutton Broth.

Cut meat off bones from 1 lb. scrag end of mutton, remove fat and cut meat into dice, then cut up bones. Put them into a large saucepan with 3 quarts water and 4 oz. well-washed barley. Bring to boil and simmer for 1 hour, skimming it well during the cooking. Now add 2 carrots, 2 sticks celery, 2 turnips, cut into dice. Simmer for 1 hour longer, then remove bones. Remove fat, add a little finely-chopped parsley, pepper and salt to taste. Serve piping hot. It is a good idea to cook 3 or 4 mutton shanks in the soup, and these can be served separately with onion, caper or parsley sauce.

Potato and Cheese Soup.

Take 1½ lb. potatoes, 2 oz. grated cheese, 1 small onion, 1 oz. butter, 1 quart vegetable stock, ½ pint milk, 1 carrot, seasoning. Peel the vegetables and cut into small pieces. Fry the onion and carrot for a minute or two in the butter, taking care not to let them colour. Add the potatoes, seasoning, and the stock. Bring to the boil and allow to simmer with a lid on until the vegetables are soft. Whisk up the soup until smooth or put through a wire sieve. Add the milk and, if necessary, some more stock or water. Heat up the soup—do not reboil. Put into a hot tureen or individual cups and sprinkle the grated cheese on top.

ASTRONOMICAL DATA FOR QUEENSLAND

JULY, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON. AT WARWICK.

July.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
	a.m.	p.m.	a.m.	p.m.
1	6.44	5.8	11.1	11.20
2	6.44	5.8	11.42	nil
3	6.43	5.8	12.24	12.21
			p.m.	a.m.
4	6.43	5.9	1.9	1.23
5	6.43	5.9	1.56	2.27
6	6.43	5.9	2.49	3.31
7	6.43	5.10	3.45	4.34
8	6.43	5.11	4.44	5.36
9	6.43	5.11	5.45	6.33
10	6.42	5.12	6.46	7.26
11	6.42	5.12	7.45	8.12
12	6.42	5.13	8.42	8.54
13	6.42	5.14	9.38	9.34
14	6.41	5.14	10.31	10.12
15	6.41	5.14	11.23	10.48
16	6.41	5.14	nil	11.23
17	6.40	5.15	12.15	11.58
			a.m.	p.m.
18	6.40	5.15	1.6	12.35
19	6.40	5.16	1.57	1.15
20	6.40	5.16	2.48	1.57
21	6.40	5.17	3.39	2.42
22	6.39	5.18	4.30	3.31
23	6.39	5.18	5.19	4.24
24	6.39	5.19	6.7	5.19
25	6.38	5.20	6.54	6.16
26	6.37	5.20	7.38	7.15
27	6.37	5.21	8.21	8.15
28	6.36	5.21	9.4	9.15
29	6.35	5.22	9.43	10.15
30	6.34	5.22	10.24	11.16
31	6.34	5.23	11.7	nil

Phases of the Moon.

2 July, First Quarter, 2.24 p.m.
9 „ Full Moon, 6.17 a.m.
16 „ Last Quarter, 6.7 p.m.
24 „ New Moon, 5.39 p.m.
31 „ First Quarter, 7.19 p.m.

FARTHEST FROM THE SUN.

EARLY last month we saw the illusive little planet, Mercury, for an hour or so after dark. As it continued its way round the luminary it gradually passed down into the brightness between us and the sun and disappeared. On 2nd July Mercury will be passing almost between us and the sun, after which it will become a morning star, but too near the sun to be seen until about the middle of the month. On 24th July the planet will be 20 degrees west of the sun, rising 82 minutes before him, a little north of east.

The Evening Star, Venus, is still low in the twilight. On 26th July, the slender crescent moon, about two and a-half days old, will be low in the west. If the crescent can be seen, Venus may be located a little north of it.

The next, in order of distance from the sun, is planet earth. This planet moves round the sun in an almost circular orbit, but the sun is a little out of the centre so that every year, about 3rd July, the earth reaches a point in its orbit which is its farthest from the sun.

EARTH OUT IN THE COLD.

This year, on 3rd July, we shall be 94,500,000 miles away from the great luminary upon whose vivifying rays the earth depends for its life. In January the distance was only 91,300,000 miles. It is not altogether this greater distance which causes the cold of winter, for England is just as far from the sun as we are and it is sometimes quite hot there at this time of the year. The cold of winter is caused by the nights being longer than the days and the sun's rays being more slanting than in the summer. The distance from the sun plays its part, for it is estimated that the earth, as a whole, receives hourly almost 6 per cent. less heat from the sun in July than it does in January. For that reason the southern winter which occurs in July is colder than the northern winter and the southern summer is hotter.

Mars is the only planet which is well seen at the present time. It rises, now, soon after 11 p.m., and is well up a few hours later. The planet may be found not far from the waning moon on 15th July. The Great Square of Pegasus shows well north of Mars. A line through the two stars marking its eastern side and continued up as far again will reach the Red Planet. It is interesting to note that Mars is now quite near the First Point in Aries, the place where the sun is at the southern autumn equinox.

The two great planets, Jupiter and Saturn, which we watched passing and repassing each other last summer, passed beyond the sun in May. They are now appearing before dawn, as morning stars. They are both near the clusters of the Pleiades and Hyades, Saturn having passed between them, and Jupiter is about to follow. Saturn rises about 3.20 a.m. and Jupiter about an hour later. They are both moving eastward. It will be noted how far Jupiter has outstripped the slower moving Saturn.

MAN IN THE MOON.

We have almost forgotten about the Man in the Moon, but those who came from the Old Country will remember seeing him in the full moon. He was a somewhat dim, bent figure with a huge bundle of sticks on his back. We cannot see him here so well, as the moon, like the constellational figures, is upside down. With a telescope the surface of the moon can be seen very clearly, as there is no atmosphere or cloud to blot out the moonscape. The dark portions which form the Man are seen to be extensive plains. According to recent spectroscopic analysis, the light which comes from them is similar to that which comes from volcanic ash. This seems to substantiate the theory that the craters, which so thickly pit extensive regions of the moon, are really volcanic craters, akin to those upon the earth.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

LOOKING NORTH ABOUT 9 O'CLOCK.

Corvus, the Crow, has been already mentioned. He is represented by the four stars near the top west corner. The short side of the figure points to Spica in the Virgin. There are five smaller stars shown belonging to this constellation which are arranged something like the stars of Canis Major, the Great Dog, for which they are sometimes mistaken. A line through Corvus and Spica and continued as far again passes near the large reddish star Arcturus, in Bootes, the Herdsman. Arcturus, Watcher of the Bear, may be known by the two smaller stars which, when in the meridian, appear like the hands of a clock pointing to 10.30 o'clock.

In 1933 the second Chicago World's Fair was opened by no less a dignitary than the Bear Watcher. Arcturus is forty light years distant, and as the first Chicago World's Fair was held just forty years before the second it was suggested that light rays which left Arcturus at the time of the first fair would arrive here just in time for the opening of the second fair, after winging their way through space 186,000 miles every second. The light rays from Arcturus passed through one of America's giant telescopes and was changed into electric impulses, which in due course operated a switch which lit thousands of electric lights, thus opening the fair by Arcturus, the Watcher of the Bear.

Near the top of the Milky Way, the reddest star in the heavens, Antaries, is shown with a smaller star on either side. The three stars at right angles to them form the head of the Scorpion, the starry curves of which are well known. A few years ago Antaries was thought to be the largest star known, but as there is a doubt about its distance, its diameter cannot be accurately measured. Between Scorpio and Virgo are two stars which mark the Scales.

According to old star maps the giant Ophiuchus, the Serpent Holder, stands upon the Scorpion; his head is marked by a bright star near a bulge in the Milky Way. He is holding down a huge writhing serpent, which appears to be striving to reach a crown. Below the Scorpion there is a curved line of stars ending in three forming a triangle; the starry curve forms the snake and the triangle the head. Corona Borealis, the Northern Crown, is just below, a very pleasing crescent of small sparkling stars. Within this circlet of stars a bright nova suddenly appeared in 1866; after shining brightly for some weeks it gradually faded.

HERCULES, THE HERO.

East of Corona and the Serpent is the large constellation of Hercules. Quite near the star, marking the head of the Serpent Holder, is a smaller star of reddish hue, Alpha Herculis, which marks the head of Hercules. The famous hero is on one knee which would be resting near the northern horizon. In his left hand, which is shown by a number of small stars towards the east, he holds two snakes, while with his uplifted right hand he wields a huge club. The four stars below, forming a four-sided figure, represents his loin cloth, while below his left hand a star marks his knee. They are all rather faint but can be easily picked out on clear, moonless nights.

Alpha Herculis, although appearing as a small star, is the largest star yet measured. This mighty sun is no fewer than 346 million miles in diameter. This means that if our sun was placed at its centre, all the planets as far as Mars, which is 145½ million miles from the sun, could still perform their revolutions round the sun, within the confines of this giant star. In fact, there would be 27½ million miles beyond Mars before the surface of this gigantic globe was reached.

The brilliant white star in the lower eastern corner is Vega.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1941 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April	No. of years' records	April, 1941.	April, 1940.
North Coast.	In.		In.	In.
Atherton	4·13	40	13·28	3·45
Cairns	11·04	59	21·91	9·00
Cardwell ..	8·53	69	25·43	3·79
Cooktown ..	8·69	65	11·91	4·07
Herberton ..	3·67	55	6·72	2·28
Ingham	7·44	49	13·49	4·63
Innisfail	19·64	60	46·17	15·40
Mossman Mill ..	8·02	28	18·18	7·51
Townsville ..	2·56	24	6·85	2·93
Central Coast.				
Ayr	2·71	54	7·41	20·62
Bowen	2·84	70	9·21	17·55
Charters Towers ..	1·47	59	5·55	1·47
Mackay P.O. ..	6·14	70	26·13	10·67
Mackay Sugar Experiment Station	4·76	44	21·38	10·10
Proserpine ..	5·99	38	11·51	17·93
St. Lawrence ..	1·53	70	3·61	1·32
South Coast.				
Biggenden ..	2·15	42	1·51	1·10
Bundaberg ..	3·23	58	2·25	1·48
Brisbane ..	3·72	89	2·07	0·50
Caboolture ..	4·48	65	1·79	2·86
Childers	2·84	46	3·16	1·26
Crohamhurst ..	6·62	48	6·45	5·55
Esk	2·94	54	1·00	0·34
South Coast—contd.	In.		In.	In.
Gatton College ..	1·87	42	0·78	0·51
Gayndah	1·48	70	0·57	0·41
Gympie	3·41	71	2·17	1·69
Kilkivan	2·23	60	0·56	0·93
Maryborough ..	3·81	70	1·83	1·69
Nambour ..	6·09	45	6·91	3·78
Nanango	1·94	59	0·60	0·91
Rockhampton ..	2·53	70	3·41	1·97
Woodford ..	4·57	54	1·79	2·98
Central Highlands.				
Clermont ..	1·58	70	5·13	1·74
Gindie	1·11	42	..	0·06
Springsure ..	1·51	72	4·12	0·80
Darling Downs.				
Dalby	1·39	71	0·37	0·31
Emu Vale ..	1·36	45	0·33	0·26
Hermitage ..	1·38	35	..	..
Jimbour	1·43	62	0·38	0·91
Miles	1·46	56	0·25	0·35
Stanthorpe ..	1·74	68	0·37	0·20
Toowoomba ..	2·59	69	1·13	0·81
Warwick ..	1·63	76	0·33	0·07
Maranoa.				
Bungeworgoral ..	1·04	27	..	..
Roma	1·28	67	0·46	0·77

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—APRIL, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure, Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.					
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points	
Cooktown	..	83	73	88	3	69	3, 4	1,191	25
Herberton	..	72	61	82	4, 5	51	28	672	25
Rockhampton	30·12	81	65	85	6, 8, 28	50	30	341	15
Brisbane	30·23	76	61	85	6	52	29	207	16
Darling Downs.									
Dalby	..	78	53	83	3, 6	34	29	37	2
Stanthorpe	..	70	48	78	2, 3, 6 (grass	25·6 min.	29 18·2)	37	5
Toowoomba	..	70	54	79	6	45	29	113	112
Mid-Interior.									
Georgetown	29·97	87	65	91	7	53	30	106	5
Longreach	30·11	84	60	92	11	*	*	210	3
Mitchell	30·19	78	51	84	7	32	29	64	3
Western.									
Burketown	..	89	69	92	7, 12	57	30	44	2
Boulia	30·09	85	63	88	8, 15	48	30	12	2
Thargomindah ..	30.15	83	60	89	22,23,26 25	41	30	..	..

* Incomplete.

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